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OF THE

AMERICAN LEATHER CHEMISTS ASSOCIATION

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CONTENTS:

Convention Notice - - - - - - - - - - - - - - - - 2
Bureau of Employment - - - - - - - - - - - - - - 2
International Union of Leather Chemists Societies—
Fourth Biennial Conference - - - - - - - - - - - 2
Council Meeting Minutes - - - - - - - - - - - - - 3
Committee Meeting on Selecting of a Paper for International Union of Leather Chemists Societies - - - - - - - - - 6
Delegate to the International Union of Leather Chemists Societies - 7
Report of Standards and Specifications Committee - - - - - - 8
Report of Physical Testing Committee - - - - - - - - - 9
Report of Leather Finishes Committee - - - - - - - - - 11
Report of Committee on Pretanning and Post-Tanning Operations - 12
Report of Tannin Analysis Committee - - - - - - - - - 14
Membership of Tannin Analysis Committee - - - - - - - 15
Report of the Hide Powder Committee - - - - - - - - - 15
A Pilot Plant Study of the Process for Treating Heavy Leather with Polyisobutylene and other Polymers
By R. OEHLER, J. H. DAVIS AND R. A. KINMONTH - - - - - - 16
Method for Restoring Original Appearance of Impregnated Leather
By J. H. DAVIS AND R. OEHLER - - - - - - - - - - - 38
The Chemistry of Vegetable Tannins XI. Mangrove
By R. C. PUTNAM AND A. V. BOWLES - - - - - - - - - - 42
Alum Retannage of Vegetable Tanned Insoles Improves their Serviceability - Discussion - - - - - - - - - - - - 46
Book Notice - - - - - - - - - - - - - - - - - - 48
Abstracts - - - - - - - - - - - - - - - - - - - 49

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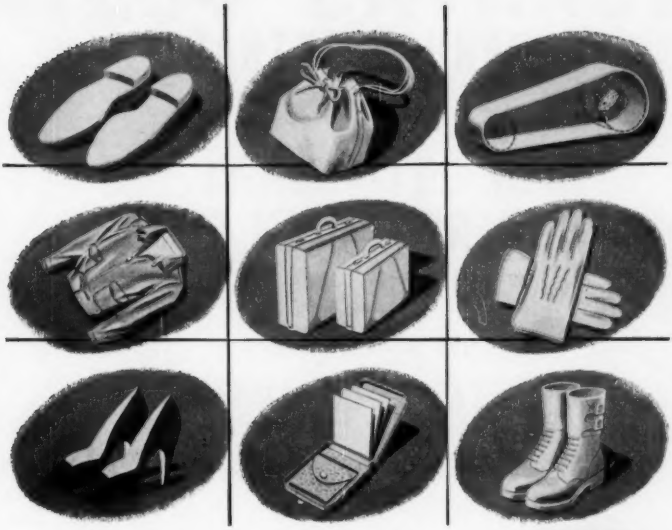

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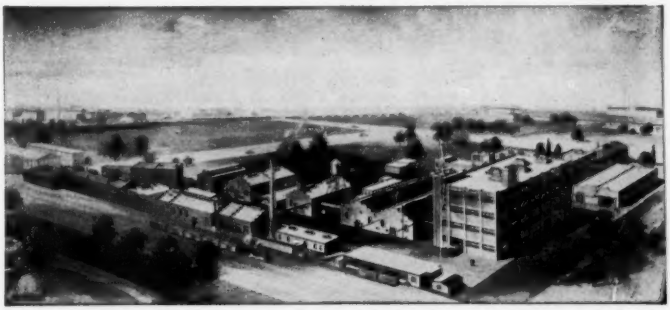

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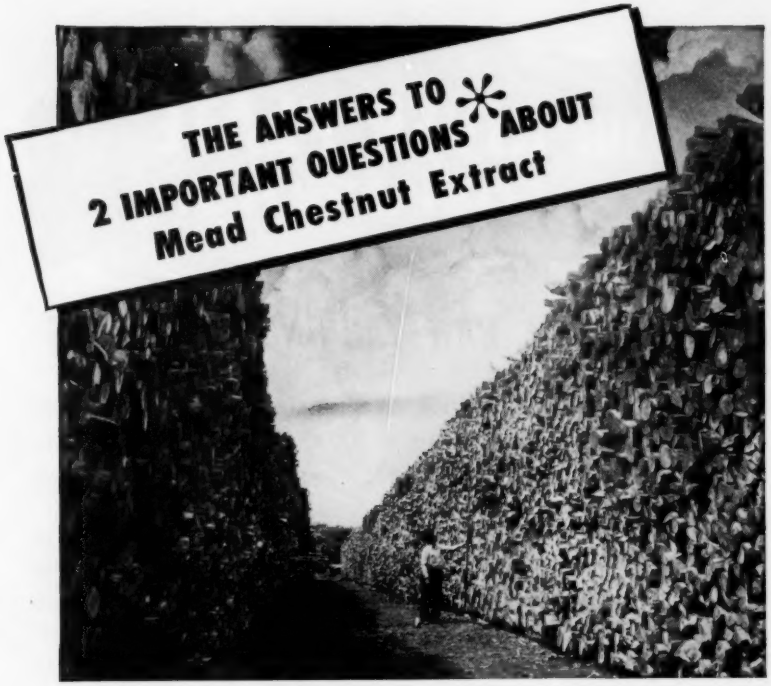

This is only a portion of the many stockpiles of chestnut logs that insure a continuous supply of Chestnut Extract.

1. Is the supply of Mead Chestnut Extract adequate?

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A. Chestnut tanned leathers do not oxidize, darken on exposure to light, or develop an uneven color on aging, as do leathers tanned with many other materials, vegetable or synthetic.

B. Since the tanning system demands acid, the use of chestnut, with its plumping acidity, saves you money.

C. Mead Chestnut Extract eliminates up to 28% of leachhouse losses.

D. There are no hidden costs. When you use Mead Chestnut Extract, no time- and money-consuming preparation is required.

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IT'S A FACT!

Mead Chestnut Extract will produce more pounds of plump leather per unit of tannin than any other tanning material.

Vegetable Tannin	Tan Yard Yield (*white weight basis*)
Chestnut Wood Extract	67%
Tanning Material A	61%
Tanning Material B	63%

Calculate your tanning material costs on a leather basis as well as on a tan unit basis. Mead Chestnut Extract, producing four to six pounds more leather, means positive savings.

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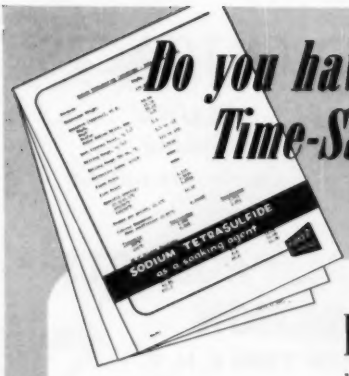

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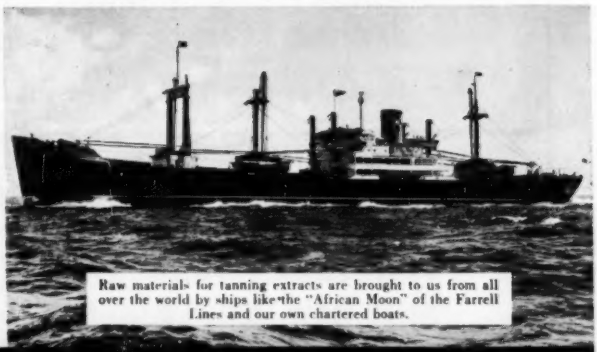

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JOURNAL OF THE
AMERICAN LEATHER CHEMISTS ASSOCIATION

Vol. L JANUARY 1955 No. 1

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CONVENTION NOTICE

The 1955 annual meeting will be held at the New Ocean House, Swampscott, Massachusetts on May 22-23-24-25.

All persons who desire to present papers are advised to submit a brief abstract of the paper to:—

Mr. D. Meo, Chairman
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c/o Salem Oil and Grease Company
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All abstracts must be in by February 28, 1955.

BUREAU OF EMPLOYMENT

RESEARCH AND DEVELOPMENT CHEMIST: 28-35 years of age. B. S. or preferably an M. S. in Organic Chemistry. Three to five years experience. Starting salary approx. $7000 year and up dependent upon experience—increases in accordance with ability. To carry out research and development work on leather and leather products. A knowledge of leather would be helpful but not necessary. Send detailed resumes to L. D. Clancy, American Employment Exchange, Inc., 127 Federal Street, Boston 10, Massachusetts.

INTERNATIONAL UNION OF LEATHER CHEMISTS SOCIETIES

"Craigieburn"
Duppas Hill Road
Waddon, Croydon
Surrey, England

The Fourth Biennial International Conference of Leather Chemists Societies will be held at the Royal Institute of Technology, Stockholm, Sweden from August 1st.–5th. 1955 inclusive, at the invitation of the Nordiska Laderkemist Foreningen.

As part of the proceedings, it is being planned to reserve one day for a symposium on "The Fundamentals of Tanning Processes", and to have an afternoon session at least on "The Properties and Merits of Leather".

Those desiring to present papers should communicate with A. Harvey, F.R.I.C., stating the title of their contribution.

More complete details of the Conference will be available at a later date.

COUNCIL MEETING MINUTES
AMERICAN LEATHER CHEMISTS ASSOCIATION

November 19, 1954

The meeting was called to order by President Flinn at 9:50 A. M. Members attending the meeting were Messrs. E. S. Flinn, R. Henrich, J. R. Kanagy, M. Maeser, F. O'Flaherty, E. B. Thorstensen, and H. R. Wilson.

Dr. O'Flaherty presented the minutes of the Council Meetings held on June 6 and June 9. They were approved by Council.

A review on the 1955 Journal advertising contracts showed that the Secretary has received thirty-eight renewal contracts with twenty-eight still outstanding. A summary of the 1954 Directory was given showing that the income from the advertising is expected to cover the cost of printing. A summary of the total sales through October 31, 1954 was also given.

The Editor was not present and his report was submitted by mail and is as follows. In 1954 the Journal published thirty-eight articles in addition to Methods for Vegetable Tanning Materials, Vegetable Tanned Leather, Mineral Tanning Materials, Mineral Tanned Leather, Beam House Liquors, Finishing Materials, and Oils, Fats and Their Products. There were one hundred and thirty-three pages of abstracts and patents, gleaned from articles appearing in more than thirty-five American, Australian, Austrian, Canadian, British, French, German, Italian, Indian, Jugoslavian and Japanese publications. Through Chemical Abstracts it was possible to include a number of abstracts from Russian Journals. Patents were taken from the British and United States Patent Gazettes. The 1954 Journal consists of seven hundred, ninety-six pages of text, which is about forty more than in 1953 and six less than in 1952. The object is to publish about seven hundred and fifty to eight hundred pages a year.

There remain to be published thirteen articles, some of which are short. At the present rate of publication these will be exhausted with the March issue. Two additional papers have been promised, so with their receipt there will be sufficient material for the April or possibly the May Journal. It is essential that the Convention provide a greater number of papers than it did in 1954 if the Journal is to maintain its customary size. As matters now stand, we should have available over the next four months about twelve additional manuscripts to carry us through the 1955 Convention period.

The selection of a delegate to be sent to the International Union of Leather Chemists Societies Meeting in 1955 was discussed. Dr. Flinn recommended Carl Telander, who is American representative of the International Leather Analysis Commission (Chemical), because of his activities and correspondence through this International Commission with other members of the

International Union of Leather Chemists Societies. Dr. Kanagy made a motion that Carl Telander be the delegate to the International Union of Leather Chemists Societies Meeting and Arthur Kay to be the delegate if Mr. Telander cannot attend. The motion was seconded by Mr. Thorstensen and approved by Council.

It was recommended that the Association should send another representative. Dr. O'Flaherty suggested that the President be sent. Mr. Maeser suggested that someone who has prepared an outstanding paper be sent to present such a paper in person. Mr. Maeser made a motion to set aside $1,000.00 from the 1954 income, in addition of the $1,000.00 set aside from the 1953 income, to defray part or totally the expenses of this delegate to the International Union of Leather Chemists Societies Meeting. It was seconded by Dr. Kanagy and approved by Council. The President appointed the following committee to make the arrangements and to select the paper: Mr. M. Maeser, chairman, with Messrs. H. R. Wilson and F. O'Flaherty.

Council discussed using color in the papers published in the Journal. Previous cases had been polled by mail vote. Council affirmed the vote by agreeing not to include color plates or color in the Journal unless the additional expenses are assumed by the author or his firm.

Dr. O'Flaherty read a letter from Dr. Jacoby requesting the Association to appoint a delegate to represent the American Leather Chemists Association at the Perkin Centennial of the Textile Chemists Association in 1956. Dr. Flinn reviewed the past minutes of November 10, 1953 meeting when Council agreed to participate and the minutes of February 11, 1954 meeting where Dr. Turley advised Council that it was requested that the Association present a panel on "The Dyeing of Leather". Dr. O'Flaherty was advised to contact Dr. E. D. Compton and request him to be the delegate and present a paper. He is also to advise the Textile Chemists Association of the delegate's name.

The following Nominating Committee was appointed by the President and approved by Council: Mr. H. Merrill, chairman, with Messrs. J. Harnly and J. H. Stumpf. They are to nominate six persons for the eventual election of three members of Council to replace the three retiring in June, 1955.

The following Awards Committee was appointed by the President and approved by Council: Dr. I. C. Somerville, chairman, with Messrs. D. Williams and J. H. Maloney.

The following new members were elected to active membership: Edward M. Filachione and John Miglarese.

The following associate members' status was changed to active membership: Tom Aldrich, Clinton E. Armstrong, C. H. Baker, Angus E. Barton, Adam M. Lammert, Harold Bernard, Donald C. Bundy, Jerome M. Cohen, Benjamin W. Crago, Gerald Glotzbecker, William Hammell, Raymond Hirsch and Leon W. Sidebottom.

Dr. Flinn recommended that more publicity about the organization should be made over and above that normally given the trade papers. Recognition in other technical societies, such as the A.C.S. and Oil Chemists, seems desirable. Council suggested that the Editorial Committee serve as the Publicity Committee. Dr. Flinn will discuss this matter with Dean Williams.

Dr. Flinn gave a brief resume of the 1954 Convention income and expenses. The total income was $3,297.00, total expenses were $3,370.21, having a loss of $73.21 in 1954. Cash on hand in the Convention Fund in August, 1954 was $1,339.25.

The 1956 Convention site will be at the Grand Hotel at Mackinac Island in the middle or late June. Dr. Flinn will meet with Mr. Meo to discuss a definite date and obtain a list of his committee.

Dr. O'Flaherty presented an estimate for the cost of a public address system of about $300.00. Mr. Maeser quoted rates he obtained. A motion was made by Mr. Thorstensen to purchase a public address system at a cost not to exceed $400.00 and to be paid for from the Convention Fund. It was seconded by Mr. Maeser and accepted by Council.

Council authorized paying the expense of the lantern operator and operator of the public address system from the Convention fund.

The meeting was adjourned for luncheon.

The afternoon session resumed at 1:00 P. M. Dr. Flinn reporting on the status of methods advised that all methods except Physical Test and Tannery Materials have been recast and published. The Physical Test Methods will be ready for republication by the end of 1954. The Tannery Materials Methods will be rewritten by Dr. Merrill and then published.

Mr. Thorstensen reporting on Methods Committees made recommendations for chairmen for the main committees which are as follows:

Vegetable Leathers	Arthur N. Kay
Mineral Tanned Leathers	Robert Adams
Physical and Mechanical Properties	M. Maeser
Preparatory and Post Tanning Processes	William T. Roddy
Industrial Waste Disposal	J. F. Wagoner
Standards and Specifications	C. G. Telander
Ways and Means	Oscar Wederbrand
Leather Finishes	Bernard Roll

The Committee on Mechanical Leathers has been dropped. Two subcommittees of the International Leather Analysis Commission were formed: Physical-M. Maeser, and Chemical-C. Telander. The above chairmen were approved by Council through a motion made by Dr. Kanagy and seconded by Mr. Maeser. The President in accordance with the By-Laws will so inform the chairmen.

Mr. Thorstensen as the technical coordinator is to consult with the above chairmen as to their composition of their committees and sub-committees. This information is then to be published.

The matter of chairman's responsibilities in matters pertaining to the Association was discussed; and so as to protect both the Association and the individual, Dr. Flinn is to write a letter outlining policy in such matters and a copy will be sent to each chairman.

The next Council Meeting will be held at Chillicothe, Ohio on February 11, 1955.

There being no further business the meeting was adjourned.

Respectfully submitted,

FRED O'FLAHERTY, *Secretary*

MEETING OF THE COMMITTEE MEETING ON SELECTION OF A PAPER FOR INTERNATIONAL UNION OF LEATHER CHEMISTS SOCIETIES

President Flinn appointed Mr. M. Maeser as chairman, with Messrs. Harry Wilson and Fred O'Flaherty as a committee to determine if a paper is available which would be of international interest and which would reflect favorably on the American Leather Chemists Association if same were presented at the biennial meeting of the International Union of Leather Chemists Societies.

Council approved the expenditure of $1,000.00 from 1954 income to partially defray the expenses of a person, selected by this committee, to attend the Meeting of the International Union of Leather Chemists Societies in Stockholm, Sweden in August, 1955.

The committee met during Council Meeting on November 19, 1954, and elected Fred O'Flaherty to serve as secretary of the committee.

It was agreed that a notice would be submitted to the Industry's trade papers of this plan and asking all persons, who may have suitable papers, to submit by February 10, an abstract or outline of the paper to the secretary.

Mr. Maeser is to prepare a letter setting forth the general details of this committee and such letter is to be sent to a list of persons or institutions which have in the past had good papers for presentation.

The committee will meet with Council on February 11, and be prepared to make a recommendation if a suitable paper is found.

The committee will conduct further deliberations by correspondence.

Respectfully submitted,

FRED O'FLAHERTY, *Secretary of Committee*

DELEGATE TO THE INTERNATIONAL UNION OF LEATHER CHEMISTS SOCIETIES

At its meeting on November 19, 1954, the council of the American Leather Chemists Association voted $1,000 to send a member to Stockholm, Sweden to read a paper before the 1955 biennial meeting of the International Union of Leather Chemists Societies.

A committee of the council was appointed to draw up the conditions of the award. The committee has set up the following simple conditions.

1. *Purpose*

The award is to encourage the preparation of an outstanding paper to be read as a contribution of the American Leather Chemists Association to the technical program of the biennial meeting of the International Union of Leather Chemists Societies at Stocholm, Sweden, in August, 1955.

2. *Eligibility*

Any active member of the Association is eligible to receive the award.

3. *Subject*

The paper may be on any aspect of leather technology, whether of a practical nature or a report of some research.

4. *Selection of the Paper*

The award will be granted to the author of the paper which is selected by the committee and the council as the best of the papers submitted; provided that, if in the opinion of the council none of the papers are worthy of the award, it will be withheld and the money returned to the general funds of the association.

5. An abstract of the paper of sufficient length and detail to give a clear picture of the work being discussed and the manner of its presentation shall be in the hands of Fred O'Flaherty, secretary of the association, on or before February 10, 1955. This is required because the first screening of the papers will take place on February 11, 1955.

6. Final selection of the paper shall be made at a time to be announced later, but at least six weeks before the annual meeting of the American Leather Chemists Association.

7. The selected paper will be read before the meeting of the International Union of Leather Chemists Societies, but the "Journal of the American Leather Chemists Association" shall have the exclusive rights to publish it.

8. Papers should be submitted to the secretary's office, Dr. Fred O'Flaherty, University of Cincinnati, Cincinnati 21, Ohio.

REPORT OF THE STANDARDS AND SPECIFICATIONS COMMITTEE

During the 1953-1954 period, the following matters were called to the attention of the Chairman:

KK-L-271c, Leather, Strap, Cattle Hide, Vegetable Tanned.
KK-B-201b, Belting, Flat, Vegetable Tanned.
KK-L-201b, Leather, Lace and Cut Lace.
KK-G-476, Lineman's Gloves.
KK-G-486, Welder's Gloves.

None of the proposed revisions contained any changes in chemical requirements or methods of analysis, and were therefore not subject to Committee action.

The Chairman attended a meeting of the Federal Specifications Technical Committee on leather and leather products, held in Washington, D. C., on September 22, 1953. At this meeting, the recommendations made by this Committee relative to KK-L-261c, Sole Leather, were again presented, discussed and approved by the Federal Committee. This action covered hide substance, degree of tannage and three sample positions. It is not known at this time if the revision of 261c is promulgated and issued.

A change in KK-L-177b, Leather, Cattle Hide, Mineral Tanned (Hydraulic Packing), relative to methods of extraction for chlorides and sulfates determination, was opposed to by two manufacturers of hydraulic packing leather, who pointed out that the change in analytical technique gave higher results. Since the maximum limits for chlorides and sulfates in the specifications were based on the old method of extraction, the manufacturers recommended an increase in allowable limits in order to compensate for the change in analytical technique. The Committee approved of the recommended change and it was forwarded to the Leather Section of the Bureau of Standards for consideration. This Committee consulted with the Chairman of the A.L.C.A. Mineral Leather Committee on this matter.

Specification KK-L-167a, Leather, Chamois, Sheepskin, Oil Tanned, was presented to this Committee for consideration. Since it represented a very specialized field, the Chairman consulted with the manufacturers and forwarded their comments and recommendations directly to the Federal Specifications Board.

A discussion concerning interpretation of sample preparation in KK-L-261c is currently pending.

Carl G. Telander, *Chairman*,
A.L.C.A. Standards and
Specifications Committee

REPORT OF THE PHYSICAL TESTING COMMITTEE

BEDFORD SPRINGS, PENNSYLVANIA

June 6, 1954

The following members were present:

F. L. Collins, International Shoe Company
C. W. Beebe, Eastern Research Laboratory
W. T. Roddy, Tanners' Council Laboratory
R. M. Lollar, Tanners' Council Laboratory
G. V. Downing, Leas & McVitty
S. S. Kremen

Guests:

E. M. Filachione
J. M. Zito, U. S. Testing Company
K. H. Knight, Graton & Knight

Changes in Methods

Since the revision of the Physical Testing Methods was completed and published in the Journal of April, 1953, the committee has done very little active work.

As the methods are being used changes are being suggested. Some of the suggestions, which have been made and the action taken by the committee, follow:

Water Penetration, Dynamic—P. 31

It has been suggested that the speed of this machine should be increased to 200 rpm instead of the present 90 rpm. Preliminary tests indicate that the increased speed has very little influence on the results, particularly when leathers with high water resistance are being tested. If the increased speed is to be used some precautions will have to be taken to prevent the water from splashing over the pan or into the specimen.

No comparative interlaboratory investigation has ever been conducted on this test. Its acceptance was based almost entirely on the single set of tests reported in the Journal, Vol. XLII, No. 8, 1947. The committee decided that it would be advisable to run a comparative interlaboratory set of tests using the present speed of 90 rpm to determine the inherent variables in the method itself and the variations which would be found between the various laboratories. Comparative tests at 200 rpm would be run in one or two laboratories. Dr. Lollar was asked to prepare a test program to be carried out by laboratories at the Bureau of Standards, United Shoe Machinery Corpor-

ation, Quartermaster Department, Eastern Research Laboratory, and the University of Cincinnati.

Stitch Tear Strength—Double Hole

Due to the high variability of leather, it is necessary to test a large number of specimens to obtain significant results when the present method is used. A specimen with five holes instead of two has been suggested. The greater number of holes gives a more integrated value, i.e., a value less apt to be effected by local variations, than the two hole method and fewer specimens are required.

Just before the meeting the man who suggested the use of a five hole instead of a two hole specimen reported that preliminary analyses of the data which he had from tests comparing the two methods indicated that the five hole specimen was no better than the two hole specimen, i.e., that the variability between specimens was as great when the five hole, as when the two hole, specimen was used.

Shrinkage Temperature

The method for determining the shrinkage temperature of leather was not included in the revision because it was felt that no pressure apparatus was available which would operate with water only and measure shrinkage temperatures above 100°C with the required accuracy and with the necessary safety.

Such a piece of apparatus has been developed by Dr. Kremen and is being considered by the committee.

Dr. Kremen is preparing a publication which will be submitted to the Journal in a short time. The committee decided to do no further work on the method until Dr. Kremen's results have been studied.

Flex Tension Test for Leather

It has been proposed that method such as suggested by T. J. Carter and J. R. Kanagy in their paper "A Flex Tension Test for Leather", J.A.L.C.A., XLIX, 1, P. 23 be considered by the committee. This is a form of endurance method which measures the life of leather when it is repeatedly flexed while under tension. The Association has no endurance method and this test would fill that need.

There seemed to be very little interest on the part of other laboratories in the matter. The committee decided to take no action at the present time.

Future Work

Most of the members of the committee feel that our chief effort should be devoted to the improvement of our present methods rather than in the

development of new ones. All phases of testing should be studied; including sampling, specimen cutting, the mechanics of the test, and the errors which are apparent and hidden; the variability within the method itself and the variation between laboratories.

The whole committee will participate in this work with various members being requested to take the lead in the different aspects of the work. No definite program will be started until fall.

MIETH MAESER, *Chairman*,
Physical Testing Committee

REPORTS OF THE LEATHER FINISHES COMMITTEE

JUNE 6, 1954

The committee is currently examining methods for evaluating the following properties of leather finishes:

Bleeding. C. Paul McKee of the International Shoe Company will submit specimens of finished leather along with samples of bleached, white, cotton sheeting to be used by the committee in evaluating a test procedure.

Covering Power of Finishes. Dr. Robert Shaw of the Rohm and Haas Company will report on a technique he has used successfully for determining the covering power of finishes.

Penetration of Finishes. The first step in devising a method for determining the extent to which a finish will penetrate into leather is to find a standard substrate which will enable one to obtain reproducible results. The committee is of the opinion that materials other than leather could be used. We are also investigating the feasibility of using insoling materials made from ground leather for this purpose.

In addition to the above, Mr. Robert Welch of the Prime Leather Finishes Company has agreed to examine the various testing methods of the Paint Section of A.S.T.M. to determine whether any of these could be applicable to leather finishes.

The committee also considered the possibility of establishing standard methods for determining the viscosity, specific gravity, pH value, and opacity of leather finishes. However, it was decided to forego work on these problems for the present.

BERNARD ROLL, *Chairman*
Leather Finishes Committee

REPORT OF COMMITTEE ON PRETANNING AND POST-TANNING OPERATIONS

Nov. 16, 1954

This committee has jurisdiction over beam-house liquor (F-methods), fats, oils, etc., (H-methods) and methods for analysis of miscellaneous materials, chiefly acids, bases, salts and sundries. Methods of the F- and H-series have been printed. Methods for miscellaneous materials are yet to be revised.

F-series. Dr. Roddy, the chairman of the sub-committee in charge of the F-methods reports that he finds no errors or needed corrections in the methods as printed.

Regarding future work, it will be recalled that previously adopted methods for determining Total Protein Nitrogen, Non-protein Nitrogen, and Heat-and-Acid-Coagulable Nitrogen were deleted from this revision because the work of Jean Jacobs showed that these methods gave erroneous results. Since then, further work by Stubbings indicates that some of Jacob's results are in error. If the Council feels that there is need for methods for determining the various categories of nitrogenous matter in beamhouse liquors, an enlarged sub-committee should study reproducibility of results by Jacobs' methods and Stubbings' modification thereof as applied to beamhouse liquors. The determination of the various kinds of proteins in skin itself by those methods appears to be a research problem, rather than a control problem, and hence beyond the scope of official methods of the association.

Mr. Roddy also reports that the Cincinnati laboratory has developed dependable methods for determination of water, fat, mineral matter, and total protein in skin. Such methods appear to have some potential value as control methods, and hence might receive the attention of the sub-committee if the Council so desires.

H-series. Mr. Leach, the Chairman of the sub-committee in charge of the H-methods, has gone over the text of the methods as printed, and recommends a number of changes, some to correct typographical errors, others to clarify the text, as follows:

H-10. This was omitted from the methods as printed. It covered specifications for apparatus and reagents, and is referred to in various methods, e. g. H 17 - 3.7 and H 20 - 3.3. This method should be printed.

H 15 (Specific gravity). An illustration of the specific gravity bottle, as originally proposed, would help the analyst to better follow the procedure.

3.3.1. - Change last sentence to read "Remove the bottle *from the bath and wipe completely dry. Weigh the bottle and contents.* Calculate the weight of water in the bottle by subtracting the weight of the empty bottle from the weigh of the bottle plus water".

5.2.1. - This gives the impression that an additional correction should be made, whereas the correction indicated has already been taken into account in 5.2. Add "This correction is included in the calculation described in 5.2."

H 16 (Melting Point).

4.5 - Add "These temperatures should agree within 0.5°C."

H 17 (Titer Test).

An illustration of the apparatus was provided with the revised method as submitted but has been omitted from the printed text. The desired illustration is given in A. O. C. S. Official Method Cc 12-41.

H 18 (Cloud and pour point)

3.6 - change to read "a disk of *cork or felt*".

4.6 - To give uniformity of phraseology, change to read "*The oil shall be heated* without stirring, instead of "heat without stirring."

H 20 (Moisture and volatile matter).

1.1 – Change the second sentence to read "It is applicable to all the ordinary fats and oils including *water-in-oil* emulsions.

Change the last sentence to read "solvents with fairly high *boiling* points" (now reads "*melting* points").

H 31(Saponification value)

3 – Add "3.6 Phenolphthalein indicator solution, 1% in 95% alcohol".

H 45 (Total desulfated fatty matter).

5. This calculation is not clear. Change to read "5.1 Calculate the total desulfated fatty matter as follows:

$$\text{Total desulfated fatty matter, per cent} = \frac{(\text{Wt. of residue in grams} \times 100)}{(\text{Wt of sample in grams})}$$

minus per cent unsaponifiable matter (from Method H-47)."

H 47 (Unsaponifiable nonvolatile matter)

1.1 Delete the repetitious "*and extracting the unsaponifiable matter*" from lines 3 and 4.

H 50 (Acidity as free fatty acids).

4. 1 – Change to read "K = acidity – – – – in milli*grams* of KOH per gram" (now reads milli*liters*)

J-50 (Sampling)

3.4 – Add "In the case of all bulk oil shipments, whether in drums or larger containers, the minimum size for each laboratory sample shall be approximately one gallon."

4. 3 – Delete the last sentence, which reads "However, additional sampling, etc."

With the exception of printing H 10, and printing the illustrations for H 15 and H 17, these corrections can be handled by publishing a "change and corrections" page in the journal, and advising the readers to make the necessary changes in the Methods Book in ink.

Mr. Leach will keep track of changes in these methods made by the A.O.C.S., or the A.S.T.M., from whom we borrowed these methods, and will inform us when and if those societies make any changes of sufficient importance to warrant incorporation in our methods.

H. B. MERRILL, *Chairman*
Committee on Pre-Tanning and
Post-Tanning Operations

REPORT OF TANNIN ANALYSIS COMMITTEE

November 6, 1954

While working on the revision of the methods of analysis, the need was clearly indicated for better methods for the qualitative detection and quantitative determination of lignosulfonates whether alone or in admixture with the more usual vegetable tanning materials. A sub-committee, under the chairmanship of Mr. J. Jany, has done a considerable amount of work on these two problems and has recommended a method for qualitative detection. It also indicated a method for quantitative estimation; however, further work is needed on this last. Pressure of other work prevented Mr. Jany from continuing the chairmanship for this study and Mr. Dahl has undertaken the task. The tests have been set up on a statistical basis and test samples are being prepared for distribution to, and test by, the members of the sub-committee. As this work is an essential confirmation of the work of Mr. Jany's original committee, the report of that committee has been held back pending the results of the present studies.

Another problem brought up during the revision was the report by several members that the percentage of tannin found in lignosulfonates by the Official Method is dependent on the time elapsing between weighing out the prepared hide powder and bringing the analysis solution into contact with it. This matter is being investigated by a sub-committee under the chairmanship of Mr. Marshall. The experimental conditions have been decided and samples are being prepared for distribution and test.

The report of these committees will be submitted as soon as their work is complete.

ARTHUR N. KAY, *Chairman*
Tannin Analysis Committee

MEMBERSHIP OF TANNIN ANALYSIS COMMITTEE

November 6, 1954

ACTIVE

Mr. R. E. Barnwell	Robeson Process Co.
Dr. M. Baum	Marathon Extract Co.
Mr. T. Blair	River Plate Corp.
Mr. J. H. Davis	National Bureau of Standards
Mr. G. V. Downing	Leas & McVitty, Inc.
Mr. J. Jany	Beardmore and Co., Ltd.
Mr. A. N. Kay	Howes Leather Co., Inc., (Chairman)
Mr. K. H. Knight	Graton and Knight
Mr. F. P. Luvisi	Agricultural Research Service, U. S. Dept. of Agriculture.
Mr. F. F. Marshall	F. F. Marshall
Mr. R. L. Moore	Moore Laboratories
Mr. L. W. Morrow	England Walton Division, A. C. Lawrence Leather Co.
Mr. E. Lorne Rayfield	Anglo-Canadian Leather Co., Ltd.
Mr. L. Sheard	International Products Corp.
Mr. G. W. Stanbery	Mead Extract Company
Mr. J. F. Wagoner	Armour Leather Company
Mr. Dean Williams	L. H. Lincoln and Son, Inc.

NON-VOTING

Mr. I. D. Clarke	U. S. Dept. of Agriculture; Chairman, Hide Powder Committee.
Mr. J. S. Rogers	U. S. Dept. of Agriculture; Chairman, Vegetable Leather Committee.
Mr. C. G. Telander	Armour Leather Company; Chairman, Standards and Specs. Committee.
Mr. J. W. Wolfe	Beardmore and Company, Ltd.

REPORT OF HIDE POWDER COMMITTEE

A sample of hide powder representing a batch prepared by Frank F. Marshall, Ridgway, Pennsylvania, designated as Lot No. 27, has been tested by the A.L.C.A. Hide Powder Committee. Average values found by the Committee members in certain comparative tests of A.L.C.A. Standard Hide Powder Lot No. 26 and the proposed Lot No. 27 were as follows:

Hide Powder Lot	No. 26	No. 27
Water soluble content, blank test residue (grams)	0.29	0.32
Ash, %	0.20	0.20
pH	5.37	5.37
Nontannin grand average, %	20.00	20.08
Date of testing May 1954		

The Committee has approved Batch No. 27 and has authorized Frank F. Marshall to issue the hide powder in this batch as A.L.C.A. Official American Standard Hide Powder, Lot No. 27. It was declared official June 6, 1954.

G. V. DOWNING G. W. SCHULTZ
A. N. KAY G. W. STANBERY
F. F. MARSHALL* I. D. CLARKE, *Chairman*

*Participated in the testing but not in the approval of the hide powder as official.

A Pilot Plant Study of the Process for Treating Heavy Leather With Polyisobutylene and Other Polymers[a]*

By RENE' OEHLER, JOHN H. DAVIS, and RAYMOND A. KINMONTH
United States Bureau of Standards, Washington, D. C.

ABSTRACTS

Pilot plant operational details are reported for treating degrained vegetable-tanned crust leather with polyisobutylene (Vistanex[b]) and with certain polymer blends. Varsol[c] was selected as the best solvent, chiefly because of its low fire and health hazards. The only equipment needed for treating leather with solutions of Vistanex are vats for soaking the leather and for washing the impregnated leather with Varsol. The Vistanex concentration of the impregnating solution should be about 35 per cent, as the deposition in leather is a linear function of the concentration of the impregnating solution. The temperature of the impregnating bath should be raised to about 40°C, as the viscosity of the solution is an inverse exponential function of temperature. Whole bends of degrained vegetable-tanned crust leather are easily treated by simple soaking in a solution of 35 per cent Vistanex LM–H in Varsol at 40° C for 3 hours, draining, washing with Varsol, draining, and warming at 40°C to remove the solvent, which results in 17 per cent deposition of Vistanex, based on the oven-dry weight of the leather before impregnation. A very satisfactory latex-pigment finish with an embossed grain can be easily and cheaply applied in almost any color from light buff to black. Certain hard, low-molecular-weight resins can be blended with Vistanex or Butyl[d] rubber to produce leather of almost any desired stiffness. These blending resins greatly reduce solution viscosity, decrease impregnation time, reduce costs, simplify cleaning of soaked leather, and are about equally effective in improving abrasion resistance. The estimated materials cost of one of these treatments is about 4 cents per pound of crust leather, based on 15 per cent uptake of resin blend by the oven-dry leather.

a. This study was sponsored by the Bureau of Supplies and Accounts of the Department of the Navy as a part of research and development project NT 001-018.
b. Vistanex is the trade name of the Enjay Co., Elizabeth, N. J., for polyisobutylene.
c. Varsol is the trade name of the Standard Oil Co. of New Jersey for a mixture of hydrocarbons boiling at 150–200°C.
d. Butyl is the trade name of the Standard Oil Co. of New Jersey for a copolymer of isobutylene and isoprene, also known as GR-I synthetic rubber when produced in Government-owned plants.

*Presented at the Fiftieth Annual Meeting, Bedford Springs, Pa., June 7, 1954.

1. Introduction

This pilot plant study was undertaken for the Department of the Navy to develop the technology of the treatment of sole leather with Vistanex. Earlier work [1] on a laboratory scale demonstrated that the expected service of sole leather can be increased approximately 80 percent by treatment with natural rubber or with Vistanex. Since the treatment requires unfilled and uncompacted leather, certain economies of inventory, tanning time, tanning materials, and labor can be effected.

The treatment consists merely of drying the vegetable-tanned crust bends with or without grain, soaking in a 35-40 percent solution of Vistanex LM-H in Varsol at 40°C for a period of 3 hours, removing the bends, draining for one hour, washing in Varsol for one minute, allowing excess solvent to drain, and drying at 40°C to remove solvent.

2. Equipment and Materials

A forced draft drying oven which accommodates full bends was used for drying prior to impregnation and for removing solvent after impregnation. However, it is thought that satisfactory drying could be done in a tannery dry loft, as the oven was operated at only 40°C. (104°F.).

The equipment for impregnating leather with Vistanex is very simple. Indeed, the only requirements are vats for soaking crust bends in Vistanex solutions and for washing the bends with Varsol after removing them from the impregnating vat. The vats used in the pilot plant were made of 16 gauge galvanized sheet iron and were 4 feet in length, 3 feet in height, and one foot in breadth. The Vistanex solutions in the vats were heated to 40°C. by six 250-watt infrared lamps. During the impregnation period the bends were slowly raised and lowered to simulate tannery rockers. The gentle movement of the bends also served to stir the Vistanex solution and thereby prevent localized overheating. From the results of laboratory-scale experiments it seems reasonable that the bends could also be piled horizontally in suitable vats. In such case, the bends should be separated by 4-mesh hardware cloth to permit the Vistanex solution to have access to the whole area of the bend.

The equipment for dissolving Vistanex in Varsol consisted of a 55 gallon drum provided with a removable head, and a drum tumbler operated at 12 rpm. The contents of the drum are heated to 60°C. by eight 250 watt infrared lamps mounted in an asbestos-lined cover for the rotating drum. By this means it was possible to prepare 250 pound quantities of a 35 percent Vistanex-Varsol solution. However, equipment for dissolving Vistanex in Varsol may be unnecessary as it may be possible to purchase Vistanex solutions just as other resins are available in solution form.

The concentrations of all solutions are expressed as weight percentages.

3. The Impregnation Process

3.1 *Vistanex Grades*

Vistanex is available over a wide range of molecular weights, and some latitude of selection is possible. However, earlier work [1] indicates that the LM-H grade, which has a molecular weight of about 110,000, is the most feasible for treating heavy vegetable-tanned leather.

3.2 *Solvents for Vistanex*

Varsol was selected as the best all-around solvent for impregnating leather with Vistanex, although other solvents may be used which result in lower solution viscosities. For easy reference, viscosity data from earlier work [1] are presented in table I. The advantage of low viscosity to be gained by using chlorinated or more volatile hydrocarbon solvents is offset by the economy and comparatively low fire and health hazards of Varsol. Earlier research [1] showed no differences in deposition of Vistanex for the solvents enumerated in table I, nor when representative surface active agents of anionic, cationic, and nonionic types were used.

TABLE I

Viscosities of Vistanex Solutions*

	Viscosities of Vistanex solutions									
		B-60	B-40	B-40 + LM-H (1:1)	LM-H		LM-MS			
Solvents	Density	15% solids	20% solids	30% solids	30% solids	40% solids	30% solids	40% solids	50% solids	60% solids
	g-ml	poises	poises	poises	poises	poises	poises	poises	poises	poises
Gasoline	0.66	56.9	26.2	45.0	2.5	13.8	——	4.4	17.5	——
Varsol	0.79	96.9	41.3	79.4	4.4	21.3	1.3	6.2	30.6	——
Toluene	0.87	28.8	16.9	31.3	1.9	9.4	——	3.1	11.3	——
Chloroform	1.50	25.0	10.6	19.4	1.3	5.6	——	1.9	6.9	——
Trichloroethylene	1.46	——	11.3	18.1	——	5.6	0.6	1.9	6.2	87.5
Carbontetrachloride	1.60	——	23.1	41,8	——	12.5	——	——	——	——
Varsol+ Chloroform (4:1)	——	142.5	35.0	——	——	16.2	——	4.4	——	——

*Measured with a Gardner bubble viscometer at 73°F.

3.3 *Viscosity of Vistanex Solutions*

Low viscosity Vistanex solutions are desirable for impregnating leather because of the more rapid rate of penetration. The viscosity of Vistanex solutions is readily and easily lowered by increasing the temperature. Figure 1 shows a linear semilogarithmic relation between viscosity and temperature. The ranges of temperature and concentration of Vistanex solutions deemed experimentally feasible for impregnating leather are approximately 24 to

54°C. and 27 to 48 percent of Vistanex in Varsol. Figure 2 shows a linear semi-logarithmic relation between viscosity and concentration over the same ranges of temperature and concentration as shown in figure 1. Figures 1 and 2 are useful for adjusting the concentration of solutions in control work.

Another method of reducing viscosity of Vistanex solutions is by the addition of selected nonsolvents, poor solvents, or other solvents which tend to reduce the mean molecular extension of the dissolved polymer molecules [2, 3].

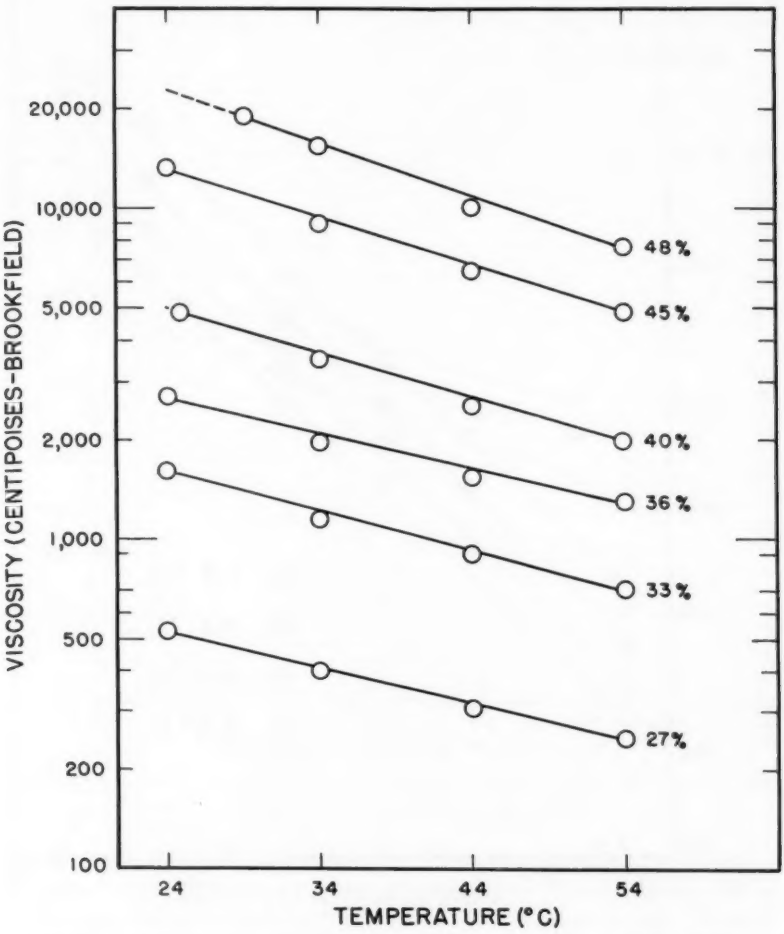

FIGURE 1. Effect of temperature on viscosity of Vistanex-Varsol solutions of different concentrations.

The research of Evans and Young [4] was used as a guide in selecting the non solvents and poor solvents for study. For this purpose, part of the Varsol of 33 percent Vistanex solutions was replaced by different solvents so that the volume fraction of the combined solvents was always the same. Solvent blends studied were: 8 percent dichloroethylene and Varsol; 9 percent

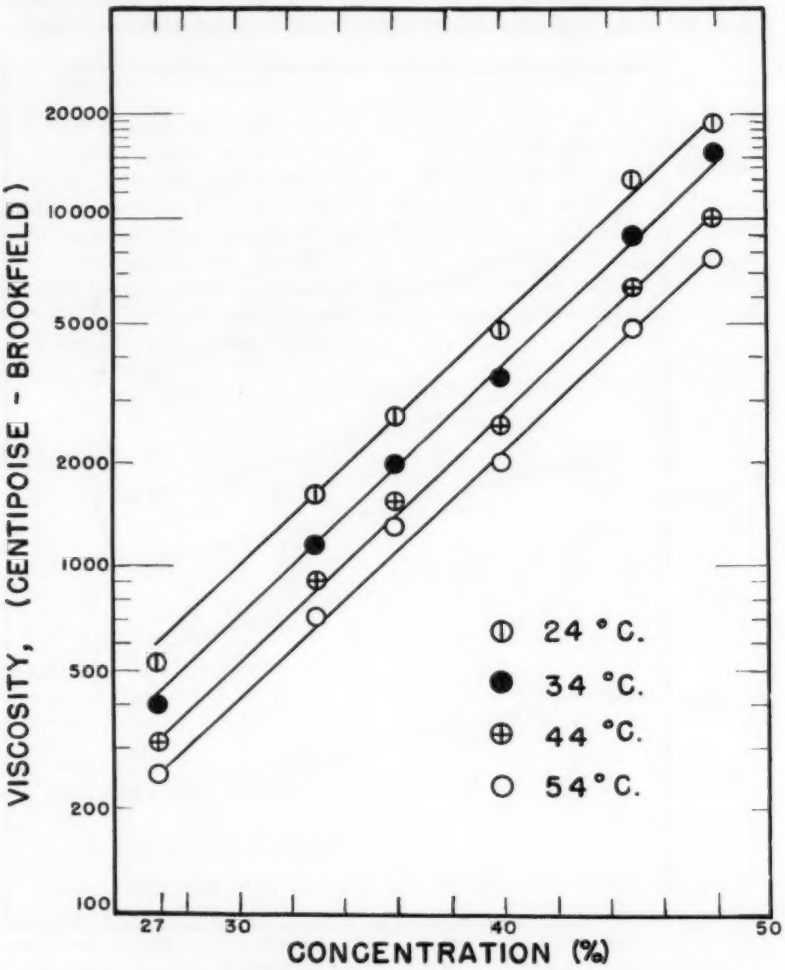

FIGURE 2. Effect of concentration on viscosity of Vistanex-Varsol solutions at different temperatures.

isopropanol and Varsol; 8 percent dichloroethyl ether and Varsol; and 45 percent dibutyl ether and Varsol. The viscosities of the Vistanex solutions made with the above solvent blends were essentially the same as that of the solution made with straight Varsol.

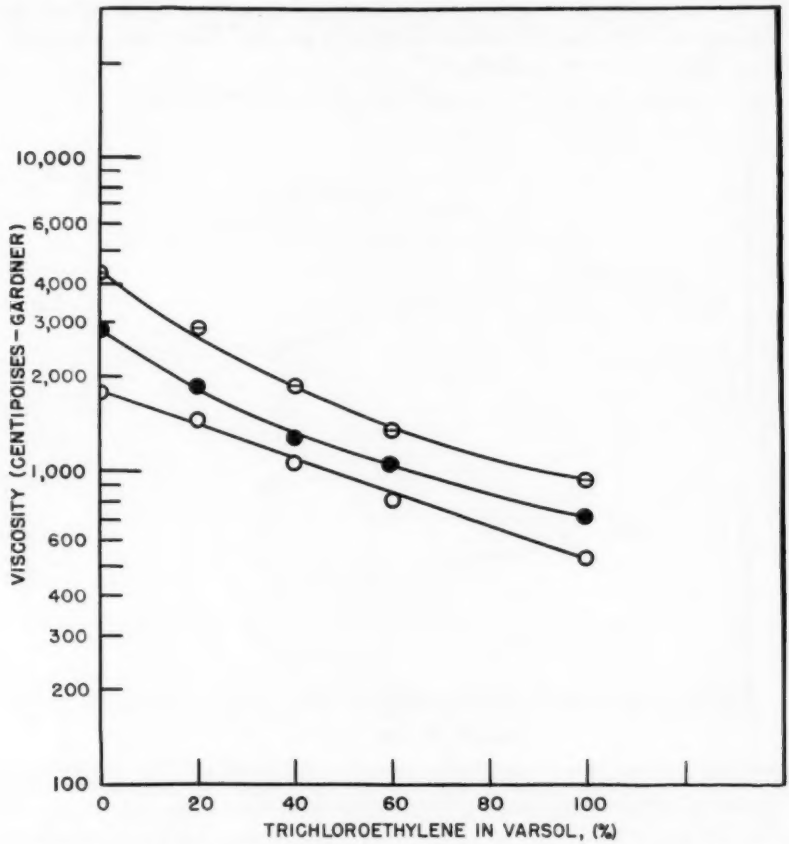

FIGURE 3. Effect of trichloroethylene in Varsol on viscosity of 30- per cent Vistanex solutions at different temperatures. ○ 55°, ●38°, ⊖23° C.

Trichloroethylene and Varsol were used to make 33 percent solutions of Vistanex so that the volume fraction was constant. Figure 3 shows that at 55 °C. there is essentially an inverse linear relation between the log of viscosity and percentage of trichloroethylene in the solvent blend. At 23 and 38 °C. the inverse relation is not linear.

3.4 *Type of Leather Treated*

This study was concerned with improving sole leather and since vegetable-tanned leather constitutes the major portion of production of sole leather, this work was devoted exclusively to the treatment of this type of leather. Early work showed that removal of uncombined tannin by bleaching increased the deposition of Vistanex by about 4 percent. Thereafter, the bends were bleached at the tannery.

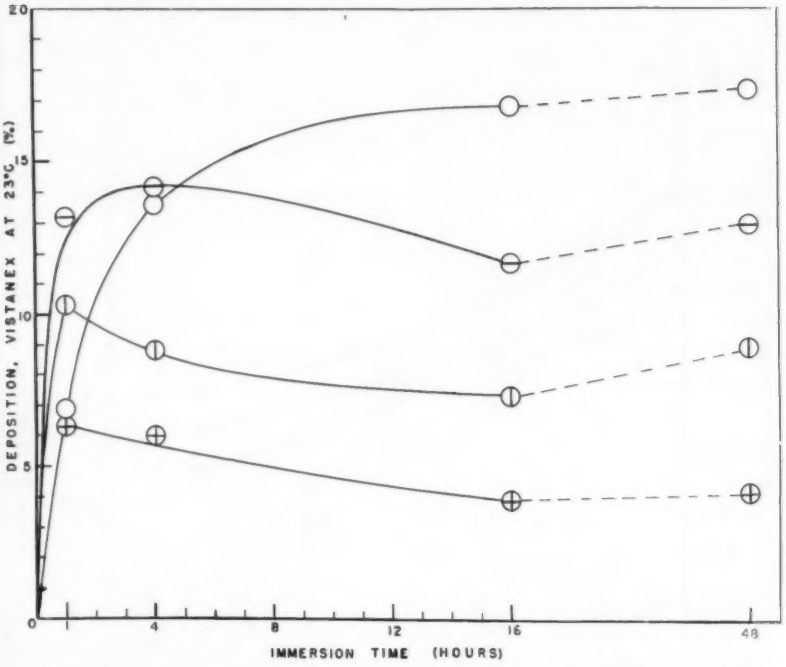

FIGURE 4. Effect of immersion time on deposition of Vistanex at 23° C. from solutions of different concentrations. O 45-per cent solutions; ⊖ 36-per cent solution: ⓘ 27-per cent solution; ⊕ 18-per cent solution.

3.5 *Impregnating Conditions*

An extensive experiment was designed to study the effect of temperature of the impregnating solution, the effect of concentration of Vistanex in the impregnating solution, and the effect of time of impregnation on the extent of deposition in vegetable tanned crust leather. Four degrained specimens (3-inch by 5-inch) were used for each combination of treatments and were assigned to the different treatments by random numbers. The results of the experiment are shown in figures 4 and 5. In general, the deposition curves in

figures 4 and 5 are typical absorption curves. For the most viscous solution (45-percent concentration at 23°C) the deposition rises steadily for the full 48-hour period. However, for the two lower concentrations the deposition reaches a maximum in about one hour. The subsequent apparent reduction

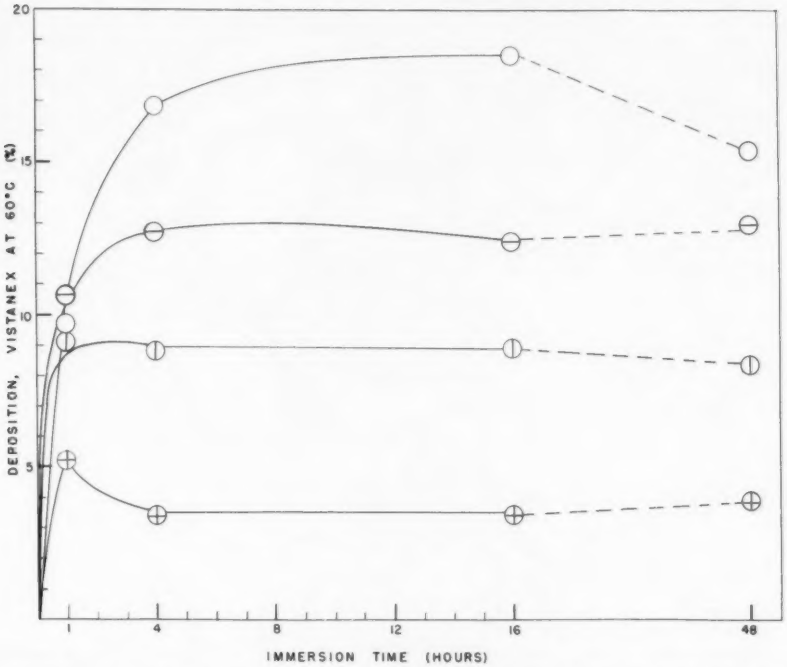

FIGURE 5. Effect of immersion time on deposition of Vistanex at 60°C. from solutions of different concentrations. ◯ 45-per cent solution; ⊖ 36-per cent solution; ⓘ 27-per cent solution; ⊕ 18-per cent solution.

in deposition is attributed to the leaching of grease from the leather by the dilute and thin solutions. For solutions in the useful concentration range (30-40 percent) there was no significant difference in the rate nor in extent of deposition at 23° and 60°C. However, the cleaning of 40 percent solutions of Vistanex from the surface of the immersed leather when removed from the impregnating vats is greatly facilitated by warming to 40°C. Figure 6 shows that the amount of Vistanex deposited at equilibrium solution absorption is a linear function of the concentration of the Vistanex in the impregnating solution.

Subsequently, a smaller experiment was designed to study immersion in Vistanex solutions at 40°C. for one- to three-hour periods. The results are

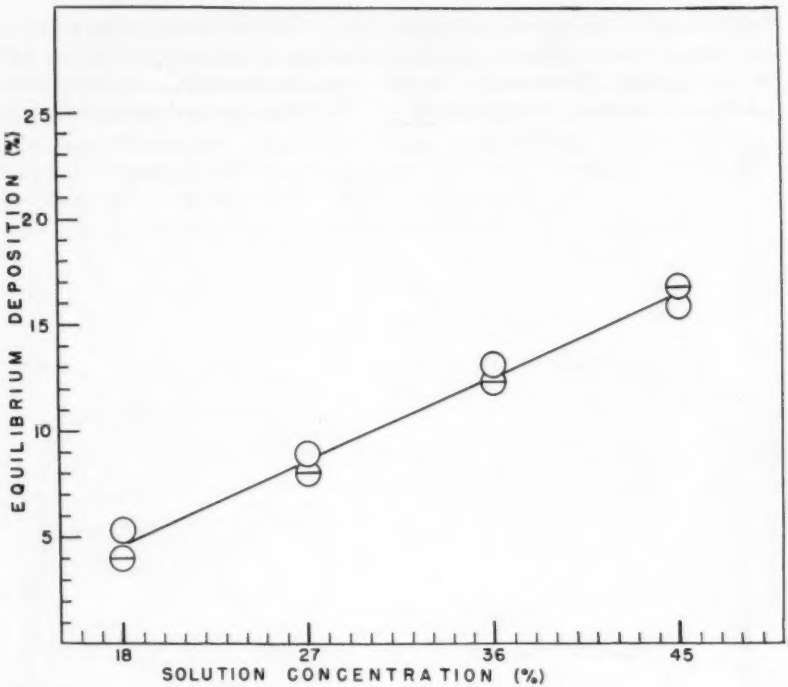

FIGURE 6. Effect of Vistanex solution concentration on equilibrium deposition. ⊖ impregnation at 60° C.; ⊕ impregnation at 23° C.

given in table II. It is apparent from the data that Vistanex deposition from the 36 percent solution essentially reaches equilibrium within an hour, as the gain during the second and third hours is very small. However, for the 40 percent solution there is a substantial gain in deposition during the second hour, but not during the third. These conclusions are confirmed by statistical analysis.

TABLE II

Mean Deposition of Vistanex in Vegetable-tanned Crust Leather From Solutions in Varsol

Impregnation time	Deposition of Vistanex LM-H from 36% solution	Deposition of Vistanex LM-H from 40% solution
hr.	%*	%*
1	11.4	10.9
2	12.0	13.6
3	12.1	14.6

*Each value is the mean deposition in 6 degrained vegetable tanned crust taps, based on the oven dry weight of the leather before impregnation. Pooled standard error = 0.84 per cent.

The Vistanex process may be applied to leather with and without grain. Treatment of degrained leather is favored because the deposition is more uniform throughout the thickness of the leather than for the undegrained. The grain split also provides a potentially valuable by-product for use in upholstery, luggage, bookbinding, etc.

Table III shows that the amount of grease in leather (up to about 8 percent) had no effect on the deposition of Vistanex. For this experiment, 4 crust bends were fatliquored in the experimental tannery of a large producer of sole leather. Table III also shows the amount of grease found in these bends by the official sampling and analytical procedure of the American Leather Chemists Association.

TABLE III

Vistanex Deposition Results of Leather With Different Amounts of Grease

Deposition of Vistanex* in crust leather without grain		Deposition of Vistanex* in crust leather with grain	
Grease by analysis	Vistanex deposited	Grease by analysis	Vistanex deposited
%	%	%	%
2.6	16.7	3.0	17.5
2.8	13.2	3.8	15.3
3.5	14.7	4.4	14.2
7.0	16.6	7.9	18.8

*A 36 per cent solution of Vistanex LM-H in Varsol was used.

3.6 *Treatment of Whole Bends with Vistanex*

Six degrained vegetable-tanned crust leather bends were treated with Vistanex; the mean deposition was 17.2 percent with a range of 15.3 to 18.6 percent. The bends were first dried at 42°C., then immersed 3 hours in a 35 percent solution of Vistanex at 40°C. After the impregnation period the bends were easily cleaned by hoisting above the impregnating vat to drain for one hour. Then the bends were slowly raised and lowered in a vat of Varsol for one minute, and allowed to drain and dry in the room overnight. The bends were finally oven dried at 42°C. for 2 days and the Vistanex deposition calculated.

4. Finishes for Vistanex-Treated Leather

Application of a wax-pigment finish to degrained, Vistanex treated vegetable tanned crust leather followed by low pressure smooth-plating results in a satisfactory finish. However, the cost of such a finish is prohibitive. On the other hand, an excellent latex-pigment finish can be applied followed by an embossed grain. Such a finish is quite cheap, and lends itself to almost any color from light buff to black.

5. Suggested Modification of Vistanex Treated Leather With Polymer Blends

Service tests on Vistanex treated vegetable tanned crust leather showed that some lateral spreading occurred in the soles from shoulder and belly

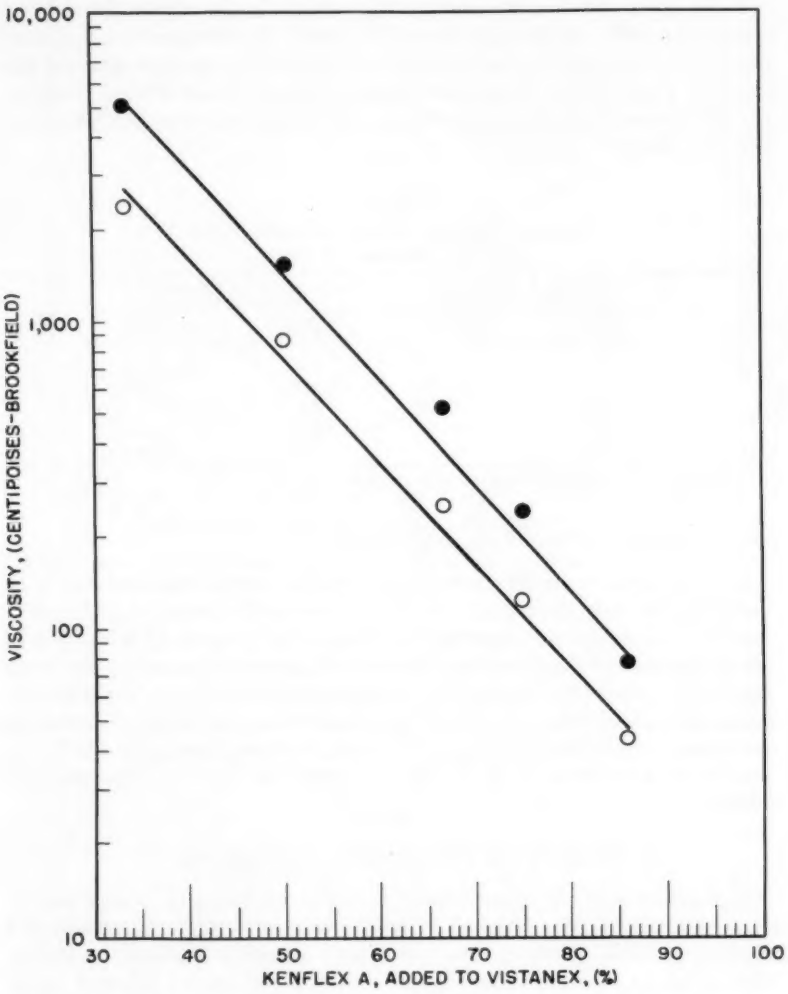

FIGURE 7. Effect of added Kenflex on viscosity of Vistanex solutions of same combined solute concentration. ● 50 per cent solids; ○ 40 per cent solids.

areas. This spreading or creep could probably be overcome by rolling after the Vistanex treatment. However, it was also thought that the creeping could be reduced by blending a harder resin with Vistanex. Almost any desired stiffness can be imparted to the treated leather by simple adjustment of the ratio of hard resin to Vistanex. A suggested list of polymers which might be blended with Vistanex is shown in table IV. The current prices shown reflect the potent economic advantage of substituting substantial amounts of cheaper polymers for Vistanex. A comprehensive study of the effects of all the resins listed has not been made, but preliminary results indicate that several of them are promising. All the polymers listed are soluble in Varsol, except the styrenated coumarone-indene type which requires half Varsol and half of an aromatic solvent. Unless otherwise noted, Varsol was used to prepare all solutions. The hard resins investigated are low in molecular weight compared to Vistanex, and therefore solutions of Vistanex blends of the same concentration have decidedly lower viscosities than solutions of straight Vistanex. The viscosity lowering by Kenflex A[a] is illustrated in figure 7. A comparison of figures 2 and 7 strongly suggests that the added resin merely acts as solvent because both figures show a linear semilogarithmic relation between solution viscosity and concentration of Vistanex. The resin used for blending may be regarded as a diluent or solvent for Vistanex or the Vistanex may be regarded as a plasticizer for the hard resin.

TABLE IV

Suggested Polymers for Impregnating Leather and Their Current Prices

Polymer	Cost per pound
	cents
Polyisobutylene	45
Formaldehyde condensate of methylated benzene and naphthalene	25
Butyl rubber	22
Styrenated coumarone-indene	18
Coumarone-indene	14
Semi-hard hydrocarbon resin	13–18
Polymerized rosin	10

It would be expected that these low viscosity solutions would quickly penetrate leather. Figure 8 confirms this expectation for solutions whose viscosities vary from 100 to 350 centipoises, whose solids composition varies from straight Piccoumarone 480K[b] to a blend of 2 parts Polypale WG[c] and

a. Kenflex A is the trade name of the Kenrich Corp., Maspeth, N. Y., for a formaldehyde condensate of mixed isomers of dimethylnaphthalene and trimethylbenzene.

b. Piccoumarone is the trade name of the Pennsylvania Industrial Chemical Co., Clairton, Pa., for a styrenated coumarone-indene resin.

c. Polypale WG is the trade name of the Hercules Powder Co., Wilmington 98, Delaware, for a polymerized rosin.

one part Butyl rubber (GR-I 40), and whose respective concentrations are 40 and 30 percent. The linear relationships shown in figure 8 are useful for deducing the solution absorption and solids deposition to be expected from similar blends of resins. The relation between deposition results and solution concentrations for these low-viscosity solutions is analogous to the linear relation, illustrated in figure 6, for the high-viscosity solutions of Vistanex used with correspondingly longer immersion periods. The data in figure 8 show that nearly maximum deposition is obtained in only 10 to 20 minutes immersion. Furthermore, the low viscosity solutions drain so well from the leather when it is removed from the impregnating bath that no manual cleaning or washing with solvent is necessary.

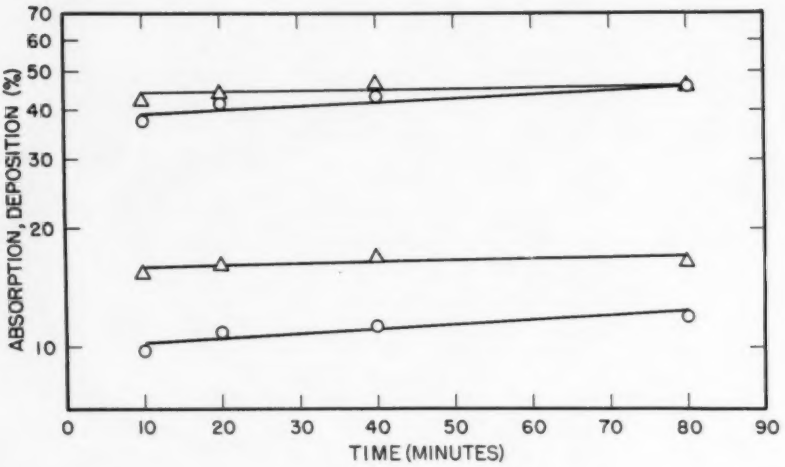

FIGURE 8. Effect of immersion time on solution absorption and polymer deposition. Upper pair of lines represent solution absorption and lower pair represent polymer deposition; O 30 per cent solution of 2 parts Polypale and 1 part Butyl rubber; △ 40 per cent solution of Piccoumarone 480K.

Although leather specimens treated with blends of hard resins with Vistanex or Butyl rubber are stiffened considerably, they are not cracky, even at low temperatures. For example, leather treated with a blend consisting of 6 parts Kenflex A to one part Vistanex, or 6 parts Polypale rosin to one part Vistanex, or 2 parts Polypale rosin to one part Butyl rubber, showed no evidence of cracking when bent 180° over a 1½-inch mandrel after conditioning 18 hours at −33°C.

As a consequence of the satisfactory performance in the low temperature test, abrasion tests were also run. Six taps were used as specimens for each

treatment. These taps were selected from one double bend by use of random numbers so as to reduce bias due to position effect. In addition to the seven sets of specimens for treatment, one set was cut from a tannery finished bend of comparable weight, using the same sequence of random numbers for selection of locations. The impregnation results of the seven treatments are summarized in table V.

TABLE V.

Deposition Results of Some Vistanex-Kenflex Blends

Treatment code	Concentration of Varsol solution	Vistanex	Kenflex	Viscosity of solution at 25.5° C.	Mean values of 6 taps	
					Deposition	Thickness of treated leather
	%	parts	parts	centipoises	%	mils
A	40	All	None	3200	21.8	225
B	40	2	1	775	22.6	238
C	40	1	1	320	21.8	235
D	40	1	2	110	21.9	215
E	50	2	1	3800	29.1	220
F	50	1	1	1400	31.2	223
G	50	1	2	360	30.4	218
H Controls (finished sole leather)						228

Abrasion tests were performed as prescribed in Federal Specification KK-L-311a, except that the load on the Prony brake was reduced from 20 to 10 pounds and the load required to lift the wheel at point A of figure 4311A was reduced from 36 to 26 pounds. In an extended experiment of this kind one is handicapped by run to run variability due to differences in the abrasion paper. For this reason, it was deemed necessary to design the experiment statistically in order to make corrections for the run to run variability.

Specimens (2-inch by 4-inch) for abrasion testing were cut from the middle of the treated taps in order to reduce edge effects of impregnation. The abrasion results were statistically analyzed and the corrected endpoint values are shown in figure 9. The endpoints were taken at 28,000 revolutions, which corresponded to abrasion of 60 per cent of the original thickness of the control specimens of finished sole leather. There are insufficient data to prove a real difference between the abrasion resistance of any of the treatment. Therefore, since all the treatments are about twice as good as the controls, one can advantageously choose the treatment which has the greatest processing advantages and otherwise produces a product of satisfactory stiffness and solidity. Accordingly, the tentative choice is with a 40 per cent solution of equal amounts of Vistanex and Kenflex.

A more limited abrasion test was made to compare treatments with Butyl rubber, Vistanex, a blend of 2 parts of Polypale to one part Butyl rubber, and

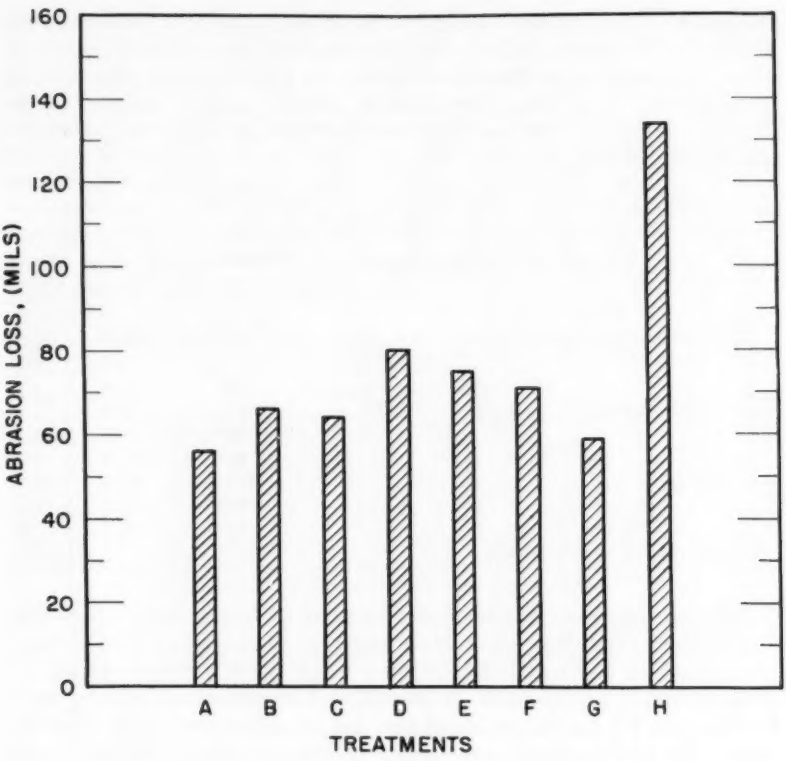

FIGURE 9. Comparative abrasion loss of control specimens and specimens treated with different polymers. A, 22 per cent Vistanex; B, 23 per cent of 2 parts Vistanex and 1 part Kenflex; C, 22 per cent of 1 part Vistanex and 1 part Kenflex; D, 22 per cent of 1 part Vistanex and 2 parts Kenflex; E, 29 per cent of 2 parts Vistanex and 1 part Kenflex; F, 31 per cent of 1 part Vistanex and 1 part Kenflex; G, 30 per cent of 1 part Vistanex and 2 parts Kenflex; H, Controls, finished sole leather.

crust leather controls. GR-I 40 has the lowest molecular weight of any Butyl rubber commercially available; the Mooney viscosity range is 30 to 40. In order to obtain a Varsol solution of GR-I 40 with a suitable viscosity it was necessary not to exceed a concentration of about 20 per cent. Pertinent data on impregnating solutions and deposition are shown in table VI. Figure 10 shows the corresponding abrasion results obtained from leather treated with 13 per cent Vistanex, 13 per cent of 2 parts Polypale and 1 part GR-I 40, and with 6 per cent GR-I 40. Figure 10 also indicates the level at which 60 per cent of the original thickness of the leather has been abraded, as well as

an adjusted 60 per cent level. The adjustment was made to account for the fact that approximately 45 mils were split from the grain of the treated specimen. This adjustment was calculated from the slope of the straight portion of the abrasion curve and the revolutions required to abrade the 45-mil grain from the control specimens. The figure shows that the Vistanex treatment is best. Calculations show that the Vistanex treatment improves abrasion resistance about 64 per cent over the controls. This improvement is somewhat less than usually found for the Vistanex treatment, and it is attributed to the normal variations of leather and the impregnation process. Leathers treated with Butyl rubber and a Polypale blend of Butyl rubber show about equal abrasion resistance, despite the fact that the Butyl deposition was only half that of the Butyl-Polypale blend. In view of low material costs, these test results suggest that blends of Butyl rubber and Polypale be studied further.

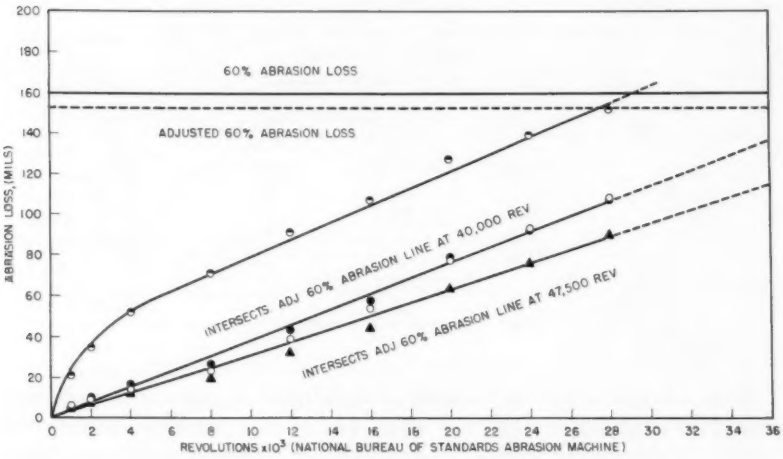

FIGURE 10. Comparative abrasion results. ○, specimens treated with 13 per cent 2 parts Polypale and 1 part GRI–40; ▲, specimens treated with 13 per cent Vistanex; ●, specimens treated with 6 per cent GRI–40; ◓ controls, vegetable crust leather.

In order to determine the depthwise distribution of the various Vistanex-Kenflex blends, the "doughnut" residual from cutting 2– by 4–inch abrasion specimens from the treated taps was split into 5 equal layerwise cuts. The splits were lettered alphabetically from grain to flesh. It should be recalled, however, that the treated specimens were all degrained before treating so that split A is not actually the grain layer but adjacent to it. The splits were

extracted with benzene, and the distribution of impregnants is shown in table VII. This table indicates that about the same distribution pattern occurs for the polymer blends as for Vistanex.

TABLE VI

Comparative Deposition Results Obtained with Vistanex, Butyl Rubber, and a Butyl Rubber-Polypale Blend

Vistanex	Butyl rubber (GR-I 40)	Polypale	Varsol solution concentration	Solution viscosity	Mean deposition in 4 specimens
parts	parts	parts	%	centipoises	%
All	——	——	36	——	13.2
——	All	——	20	2900	6.3
——	1	2	30	380	12.7

TABLE VII

Layerwise Distribution in Leather Treated with the Indicated Solutions

Split	Layerwise deposition in specimens treated with 40% Varsol solution of:			
	All V*	2 V:1 K†	1 V:1 K	1 V:2 K
	%	%	%	%
A	20.8	29.1	25.1	24.8
B	12.5	15.6	12.6	13.8
C	10.9	12.5	10.1	11.8
D	15.9	14.1	14.2	16.8
E	27.4	30.2	31.6	36.7
Total deposition	21.8	22.6	21.8	21.9

* Vistanex LM-H.
†. Kenflex A.

It is well known that an unmodified rosin treatment of leather stiffens it and greatly reduces its usefulness when aged at room temperature for a few weeks. Although the stability of Polypale rosin toward oxidation is much greater than that of unmodified rosin, it was deemed necessary to make an accelerated aging test on leather treated with Polypale rosin. The accelerated aging test was carried out at 100°C. over a period of 4 weeks, using stiffness as a measure of aging effect. The stiffness tests were carried out in accordance with Federal Specification KK-L-311a, Leather; Methods of Testing and Sampling. Triplicate specimens of degrained crust leather were randomized for each of the 4 aging periods, namely, 0, 1, 2, and 4 weeks. From this lot of randomized specimens, one group was treated with 15.7 per cent Vistanex, one group with 18.3 per cent of a blend of 6 parts Polypale rosin to one part Vistanex, a third group was used for controls, and a fourth group of specimens was discarded. However, for comparative purposes, another group of speci-

mens was cut from a comparable sole leather bend in exactly the same locations as the discarded group from the crust bend. The results of the aging test are shown in table VIII. The results shown are for a 20° bending of the specimens. It is clear that none of the first 3 groups in the table manifest an aging effect. The mean results for the Polypale-Vistanex treatment appear to show an aging effect. However, no significant aging effect was found when the wide variation between specimens was taken into account by a t-test between the means of aged and unaged specimens. Flexing of leather usually decreases stiffness. Hence, in these tests the flexed specimens which were treated with Vistanex-Polypale were not as stiff as the unflexed finished sole leather.

TABLE VIII

Accelerated Aging Resistance at 100°C., Based on Change in Stiffness of Leather*

	Stiffness (E)* before flexing				Stiffness (E)* after flexing			
	Aging period				Aging period			
Kind of leather	0 wk	1 wk	2 wk	4 wk	0 wk	1 wk	2 wk	4 wk
Finished sole	20.5	18.5	21.6	19.4	9.3	4.8	9.7	9.0
Degrained crust	10.8	9.6	11.8	11.5	5.3	3.9	5.6	6.3
Degrained crust treated with 15.7% Vistanex	15.2	12.7	14.5	17.0	7.6	4.1	6.4	7.0
Degrained crust treated with 18.3% blend of 6 parts Polypale, 1 part Vistanex	52.6	60.9	58.6	63.9	14.3	12.7	14.4	14.3

* Each value is the mean of 3 specimens. E is the stiffness factor calculated according to Federal Specification KK-L-311a.

From the preliminary results obtained with polymer blends it appears that considerable latitude is available for tailoring leather to meet the requirements of special needs.

The material cost of treating one pound of vegetable-tanned crust leather is estimated to be about 4 cents, based on 15-per cent weight gain of a blend consisting of one part Butyl rubber and 2 parts Polypale rosin.

6. Summary

(a) Pilot plant operational details are presented for treating vegetable tanned crust leather bends with Vistanex.

(b) The behavior of blends of Vistanex with certain polymers is discussed. Several of these impart the same abrasion resistance as the straight Vistanex treatment. Their advantages are lower price, controlled stiffening effect,

lower solution viscosities and consequently shorter immersion periods and simplified cleaning of leather on removal from the impregnating vat.

(c) The equilibrium deposition of Vistanex and polymer blends is a linear function of the concentration of the impregnating solution.

(d) The logarithm of the viscosity of solutions of certain low molecular weight polymer blends with Vistanex shows an inverse linear relationship to the amount of added polymer.

(e) The material cost of treating one pound of vegetable tanned crust leather is estimated to be about 4 cents, based on 15 per cent weight gain of a blend consisting of one part Butyl rubber and 2 parts Polypale resin.

Acknowledgment

The authors wish to express their appreciation to Mr. John Mandel for the design and statistical analysis of the more complex experiments reported in this paper.

7. References

1. Oehler, R., Dahl, S., and Kilduff, T. J., *J. Am. Leather Chem. Assn.* **47,** 642 (1952).
2. Huggins, M. L., *J. Phys. Chem.* **42,** 911 (1938); Ibid. **43,** 439 (1939); *J. Applied Phys.* **10,** 700 (1939).
3. Ferry, J. P., and Ashworth, J. N., *J. Am. Chem. Soc.* **71,** 622 (1949).
4. Evans, H. C., and Young, D. W., *Ind. Eng. Chem.* **34,** 461 (1942).

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Discussion

A. N. Kay: This matter of impregnation of leather, particularly sole leather, with various materials, to upgrade the product, has been a matter of interest, I think, to most of us for a good many years. Unfortunately the original samples were definitely poor in appearance. They could not be sold as such. The question of having to dispose of a grain split, with all of the economic angles involved, has put something of a damper on the thing. However, it now looks as if Mr. Oehler and his colleagues have managed to overcome partially at least, those difficulties.

There are a number of questions that come to mind. He spoke of the variable stiffness, the controlled stiffness that could be obtained with these materials. I am just wondering whether this material would upgrade portions of the hide such as shoulders and bellies?

R. OEHLER: We think that impregnation of shoulders and bellies would upgrade those portions of the hide. We can get any desired stiffness that one might wish. As a matter of fact, one of the things which several tanners have commented to us about in the past on the straight Vistanex impregnation, was that the resulting leather was too flabby and flexible. By varying the proportion of the harder materials, any desired stiffness can be obtained.

KAY: There is also the very pertinent question, I think, that it is all very well having these laboratory results on abrasion machines, but what will it mean in terms of actual practice? Have you information as to any service testing?

OEHLER: Yes, sir, this week the Department of the Navy is fabricating 200 pairs of shoes for us, half of which will be soled with straight Vistanex impregnated soles, and one-half will be four parts of Polypale to one part of Butyl rubber. Each impregnated sole will be paired with a sole from the opposite half of the hide.

J. H. MALONEY (A. C. Lawrence Leather Company): We have been interested for a period of time in increasing the water resistance and the wearability of sole leather. It seems to me this work of M. Oehler gives us a very good start in this direction. Through the years various methods for increasing the wear and changing the load on sole leather have been tried out and oftentimes the troubles have been that they have affected the other properties of the sole leather, that have made sole leather attractive to the shoe concerns and the ultimate wearers.

Now as far as this paper is concerned, it did not develop into that phase of the problem. However, I think there are some gentlemen in the audience here who have made some tests along these lines and may wish to comment upon them. How about you, Mr. Collin?

GEORGE W. COLLIN (Virginia Oak Tannery, Inc.): I do not know whether I can comment. The only question I would raise here is the following: Mr. Kay asked whether this process would upgrade bellies and shoulders. The question is, whether it would upgrade them to the same degree as the bends. If I impregnate shoulders and bellies, would they wear the same as the bends?

OEHLER: This is a question to which we have no answer at the moment. We have had no service test yet. We have made some abrasion tests on these poorer locations which have been treated with Polypale and Butyl rubber versus sole leather bends and have obtained essentially the same abrasion resistance. That is an indirect answer but is the best one we have at the moment.

For the color restoration we have estimated that the cost of the acetone will run something less than a half cent per pound of leather. Incidentally, I

might remark that those figures were taken on the basis of a single dip—that is, a single solvent dip. The impregnated leather was treated only with acetone. Later we found that if we make a preliminary dip with Varsol and gasoline, and then with acetone, we get a brighter color. If the first dip is made with a cheaper solvent like Varsol, the amount of acetone lost will be reduced.

A. W. HOPTON: How long will the acetone last?

OEHLER: We have not made exhaustive studies on that, but judging from the fact that only one per cent, or less, of the impregnated material is dissolved from the bend, I would say it will last for quite a while.

C. W. MANN: In reply to the question raised on the polyisobutylene soles, we have completed some experiments on the dress Army type shoe in which we find the improvement in wear is on the order of 50 per cent over standard quality vegetable tanned sole leather.

There was another point on the upgrading of the shoulders. I think there is no direct answer, of course, on this particular type of treatment but indirectly I believe there is an answer. Dr. Hobbs, at the Bureau of Standards, made some studies on shoulder sole leather treated with oil in which he compared those with bend soles. He found the oil treatment did upgrade the shoulders from the standpoint of wear to approximately the same quality as the bends. Corresponding tests on sole leather showed that oil treatment improves the wear only on the order of approximately 10 per cent. Therefore, comparing the 50 per cent improvement in wear of the polyisobutylene treatment with the 10 per cent improvement of the oil treatment, I think it is clear that the polyisobutylene treatment does upgrade leather enough to bring the shoulders up to or equal to untreated bend soles.

GEORGE V. DOWNING (Leas and McVitty, Inc.): What is the effect of vapor transmission?

OEHLER: We do not have direct data on this particular impregnating material. On some of the first work we did on impregnation the water vapor transmission, of acrylate treated leather was not too much different from the water vapor transmission of normal sole leather.

G. WALTER SCHULTZ (Elkland Leather Company): In the test of these cross-mated shoes that are going to be subjected to service tests, were the impregnated soles finished in the conventional manner or compressed in any way?

OEHLER: The impregnated soles were plated in the moist condition at about 300 p.s.i. which resulted in a net loss in thickness of one and a half

irons, so the treated soles were about the same thickness as the corresponding leather from the opposite half of the same animal.

JAMES M. THORNTON (George Moser Leather Company): I would like to find out if there has been made any layer analysis to show the degree of penetration of this material.

OEHLER: Yes. We have made a very sketchy study along those lines. We have taken impregnated leather and made five equal splits of it. For leather which had an overall deposition of about 16 or 17 per cent, the grain and the fresh splits ran about 25 to 30 per cent, the next splits would run about 20 per cent, and the middle split would run about 10 per cent. That is, of course, about what one would expect in this type of process.

SEYMOUR S. KREMEN (Tanners' Council Research Laboratory): I would like to add something to that. We repeated some of Mr. Oehler's experiments. To check the deposition we prepared some cross sections and stained them with Sudan IV, which will stain the Vistanex, and the slides showed deposition throughout, even on full grained finished soles which had been loaded and gone through the entire tannery processing. Even with high viscosity solutions, the penetration was complete in anywhere from four hours to overnight.

Because it is feasible to treat finished soles the added possibility exists, that the tanners have the option of selecting only a required fraction of their finished stock for impregnation. I think this is a thought that should not be ignored in this discussion.

OEHLER: One related comment, Dr. Kremen. We have split and disintegrated impregnated leather in the Waring Blender and made electronic micrographs of it, and found that the rubber, or the Vistanex, in either case completely covered the fibers in the innermost portions of the leather. It is only that the percentages are less, on the inside.

THOMAS BLAIR (United States Testing Company): I was wondering whether the problems of the shoe manufacturers have been investigated, such as the effect of adhesion in sole laying and channeling, or edge setting, burnishing and so forth, and whether there are any such problems they will run into.

OEHLER: If this were next week I would have the perfect answer for you. These shoes which are now being fabricated for the Department of the Navy are being made by the Doyle Shoe Company at Brockton, Massachusetts. On a much smaller scale, none of the cobblers we have engaged to put on individual soles for our service testing at the Bureau, have run into any difficulties whatsoever from the standpoint of soling or edging, and certainly

not from the standpoint of adhesion, because these materials penetrate completely, particularly those with the rosin, and are good adhesives themselves.

J. H. DAVIS: One smaller point I think Mr. Oehler wanted to include in his talk was that we have made limited flex tests on leather impregnated with Polypale rosin and butyl rubber and found, as against heavily greased leather, the flex life was more than doubled—that is, the impregnated leather had more than double the flex life of heavily greased leather, which could very well point up that impregnation might have some value in upper leather.

KAY: I was wondering whether these materials will be of advantage in the associated mechanical leathers?

OEHLER: If you have in mind, Mr. Kay, the mechanical leathers, which are used for hydraulic packing where oil resistance is a requirement, I think the answer is yes—not with these same materials which I have mentioned here today, but there is one resin which is very low in cost, which has excellent hydrocarbon resistance, and is compatible with Hycar rubber, which is also oil resistant.

KAY: If there is no further discussion, I will turn the meeting back to Dr. Turley.

Method for Restoring Original Appearance of Impregnated Leather*

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ABSTRACT

A method has been developed, on a pilot-plant scale, which restores the original appearance of vegetable-tanned crust sole leather after it has been impregnated with various types of impregnants. Laboratory tests indicate that the leather can then be dry or wet rolled and finally waxed and brushed as desired.

This method operates by first treating the air-dry impregnated leather with one or more good solvents for the impregnation material, used successively to effect removal of the impregnant from the leather surfaces. Then the leather is immediately placed in one or more poor solvents for the impregnant, used successively to dilute and remove the solvent or solvents originally employed and to stop solvent action on the impregnant. It is necessary that each successive solvent be miscible with the preceding solvent.

*This method was developed as a part of a research and development project on the impregnation of shoe soles with polymers, which was sponsored by the Bureau of Supplies and Accounts, Department of the Navy, under their project NT 001-018.

FIGURE 1. Vegetable-tanned crust bend impregnated with a blend of Polypale resin and Butyl rubber.

FIGURE 2. Same bend as in figure 1 after original appearance has been restored.

FIGURE 3. Vegetable-tanned crust double shoulder impregnated with a blend of Polypale resin and Butyl rubber.

FIGURE 4. Same double shoulder as in figure 3 after original appearance has been restored.

Impregnation of leather with various oils, waxes, resins, and polymers is being done today by the leather industry to meet demands for an improved product. Improvements imparted by impregnation are increased wear, better resistance to water and chemicals, and greater flex life. Impregnated mechanical leathers have greater ability to withstand higher temperature and pressure than the unimpregnated leathers of this type.[1-10]

In many cases, however, impregnation of leather results in objectionable color or appearance so that the value of the product from a sales standpoint is materially reduced. This is especially true for sole leather, where the customer or shoe manufacturer requires that the appearance of the product be maintained in keeping with previously set standards.

A method has been developed, on a pilot plant scale, which restores the original appearance of vegetable tanned crust sole leather after it has been impregnated with various types of impregnants. Laboratory tests indicate that the leather can then be dry or wet rolled and finally waxed and brushed as desired.

This method operates by first treating the air-dry impregnated leather with one or more good solvents for the impregnation material, used successively to effect removal of the impregnant from the leather surfaces. Then the leather is immediately placed in one or more poor solvents for the impregnant, used successively to dilute and remove the solvent or solvents originally employed and to stop solvent action on the impregnant. It is necessary that each successive solvent be miscible with the preceding solvent.

Figures 1 and 2 illustrate an impregnated bend before and after the original color has been restored by the method given in Example B below. Figures 3 and 4 illustrate an impregnated double shoulder before and after the original color has been restored by the method given in Example B. In both cases, the color of the leather after restoration is substantially the same as it was before impregnation.

The following illustrations or examples of this method are given:

Example A (where one good and one poor solvent is employed)

Leather impregnated with a blend of Polypale* resin and Butyl† rubber is immersed, in the air-dry state, in a bath of acetone at room temperature for a period of time varying from 30 to 90 seconds. The leather is agitated gently during this period and is then removed and placed immediately into a bath of warm water at 35° to 45°C, where it is allowed to remain, preferably for at least 5 minutes, then removed and hung to dry. The warm water bath should be so arranged that fresh warm water can circulate freely throughout

*Polypale is the trade name of the Hercules Powder Co., Wilmington, Del., for a polymerized wood rosin.

†Butyl is the trade name of the Standard Oil Company of New Jersey for a copolymer of isobutylene and isoprene, also known as GR-I synthetic rubber when produced in Government-owned plants.

the bath during this five-minute period. If it is desired, the warm water can be sprayed upon the leather immediately after the acetone treatment instead of using a bath. Either cold water or water at room temperature may also be used, but, in some cases, results may be less satisfactory. The acetone is the good solvent for the Polypale resin which constitutes about 80 per cent of the impregnant blend and has little or no effect on the Butyl rubber portion of the blend. Water is the poor solvent for the impregnant, and being miscible with acetone is used to remove this solvent from the impregnated leather.

This method may be modified slightly to obtain leather with a brighter color, as in the following:

Example B (where two good solvents and one poor solvent for the impregnant are used)

Leather impregnated with a blend of Polypale resin and Butyl rubber is immersed, in the air-dry state, in a bath of either gasoline or Varsol* at room temperature for approximately 30 seconds and agitated gently during this time. It is then removed and quickly transferred to a bath of acetone at room temperature for a similar period of time. It is then removed and immediately given the water bath or spray treatment as described in Example A. Gasoline or Varsol are good solvents for both Butyl rubber and Polypale resin but are used primarily to solubilize the Butyl rubber portion of the blend. The acetone is a good solvent for the Polypale resin and serves to stop solvent action on the Butyl rubber as well as dilute and remove the gasoline or Varsol. Water is the poor solvent for the impregnant, and being miscible with acetone is used to remove this solvent from the impregnated leather. Leather with a brighter color than that obtained under Example A is produced due to partial removal of the Butyl rubber.

Another modification of this method may be employed, as in the following:

Example C (where one good solvent and two poor solvents for the impregnant are used)

Leather impregnated with straight polyisobutylene (Vistanex†) is immersed, in the air-dry state, in a bath of either gasoline or Varsol at room temperature for a period of time varying from 30 to 90 seconds and agitated gently during this time. It is then removed and quickly transferred to a bath of acetone at room temperature for at least 2 minutes. It is then removed from the acetone bath and quickly given the water bath or spray treatment as described in Example A. A loose film of impregnant will be formed on the grain and flesh of the impregnated leather treated under the methods given

*Varsol is the trade name of the Standard Oil Company of New Jersey for a mixture of hydrocarbons boiling at 150°-200°C.

†Vistanex is the trade name of the Enjay Company, Elizabeth, New Jersey, for polyisobutylene.

in Examples B and C, which can be removed by brushing while the leather is still wet. Gasoline or Varsol are good solvents for Vistanex and the acetone is then used as a poor solvent for this material. The acetone dilutes and removes the gasoline or Varsol and stops solvent action on the Vistanex. Water is the other poor solvent for the Vistanex, and being miscible with acetone is used to remove this solvent from the impregnated leather.

Other solvents than those mentioned were used under the conditions of the method described. These solvents are of the alcohol, glycol, ketone, glycol ether and ester types and can be employed with varying degrees of success depending upon individual standards and judgment.

Impregnant losses varied from less than one per cent on whole bends to 2.5 per cent on cut stock. Acetone loss incurred per bend was about 5 per cent based on the air-dry weight of the impregnated leather, with no recovery system employed. This would result in an estimated material cost of approximately 0.5 cent to treat one pound of impregnated leather.

The following table shows the different types of impregnants used for impregnating vegetable-tanned crust sole leather and the methods as given in

Impregnants Used	Example
Oils, greases	A
Vistanex	C
Blend of GR-I 40 and Neville R-16A resin, dark	B
Blend of GR-I 40 and Polypale resin	A or B
Blend of GR-I 40 and Kenflex A	B
Blend of GR-I 40 and Piccopale 100	B
Blend of GR-I 40 and N wood rosin	A or B
Blend of Hycar 1032-x-8 and Vinsol resin	A or B

Examples A, B, and C which were successfully used to restore the original appearance of the leather. The solvents used with the different types of impregnants for color restoration were the same as those given in Examples A, B, and C.

The suppliers for the impregnants listed in the table are as follows:

Vistanex: Enjay Company, Inc., Elizabeth, New Jersey.

GR-I 40: Reconstruction Finance Corporation, Office of Synthetic Rubber, Washington 25, D. C.

Neville R-16A resin, dark: Trade name of the Neville Company, Pittsburgh, Pennsylvania, for a coumarone-indene resin.

Polypale resin: Hercules Powder Company, Wilmington, Delaware.

Kenflex A: Trade name of the Kenrich Corporation, Maspeth, New York, for a formaldehyde condensate of methylated benzene and naphthalene.

Piccopale 100: Trade name of the Pennsylvania Industrial Chemical Corporation, Clairton, Pennsylvania, for a polydiene resin.

N wood rosin: Hercules Powder Company, Wilmington, Delaware.

Hycar 1032-x-8: Trade name of the B. F. Goodrich Chemical Company, Cleveland, Ohio, for butadiene-acrylonitrile polymer.

Vinsol: Trade name of the Hercules Powder Company, Wilmington, Delaware, for a complex mixture of rosin acids, oxidized rosin acids, neutral high molecular weight compounds, and acidic phenolic materials such as phenolic ethers and polyphenols, derived from southern pine wood.

References

1. Cranker, K. R., and Jorczak, J. S., *J. Am. Leather Chem. Assn.* **47,** 178 (1952).
2. Cheronis, N. D., et al., *J. Am. Leather Chem. Assn.* **44,** 282 (1949).
3. Virtue, G., *U. S. Patent* 2,413, 806 (1947).
4. Niedercorn, J. C., and Thayer, F. D., *J. Am. Leather Chem. Assn.* **40,** 242 (1945).
5. Chadwick, E., *J. Int. Soc. Leather Trades Chem.* **30,** 53 (1946).
6. Frolick, Per K., *U. S. Patent* 2,093,431 (1937).
7. Oehler, R., and Kilduff, T. J., *J. Research NBS* **42,** 63 (1949); *J. Am. Leather Chem. Assn.* **44,** 151 (1949).
8. Oehler, R., Kilduff, T. J., and Dahl, S., *J. Am. Leather Chem. Assn.* **45,** 349 (1950).
9. Oehler, R., Dahl, S., and Kilduff, T. J., *J. Am. Leather Chem. Assn.* **47,** 642 (1952).
10. Oehler, R., Davis, J. H., and Kinmonth, R. A., *J. Am. Leather Chem. Assn.* **50,** 17 (1955).

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The Chemistry of Vegetable Tannins, XI Mangrove

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A preliminary study of mangrove tannin has been reported in Article IV (1) of this series. We now present the details of a more extensive purification and investigation of this phlobotannin. Mangrove was purified by removal of hot water insolubles, followed by lead salt precipitation and recovery of the tannin from the lead salt by means of oxalic acid. After solvent extraction, the tannin was dissolved in ethanol, the ash removed and the tannin recovered.

*Present address: United States Testing Company, Hoboken, New Jersey.

The mangrove was acetylated and methylated. Degradation of the tannin and its derivatives yielded phloroglucinol, protocatechuic acid and veratric acid. The data suggested $C_{30}H_{26}O_{12}$ as a possible basic formula.

1. Purification

The crude extract of Borneo Cutch, obtained from Saxe Cutch Corporation of New York was purified in the following manner in 100 g. portions. The dry mangrove was slowly added to 2 liters of boiling water. The resulting mixture was filtered at the boiling point. This removed less than 1% insolubles. The filtrate was reheated and to this a hot solution of 60 g. of lead acetate dissolved in 500 ml. of water was added. This solution was filtered at the boiling point and the precipitate of the lead salt of mangrove was washed with boiling water. The filtrates were reboiled with an additional 60 g. of lead acetate solution to obtain a second smaller precipitate which after washing was added to the first.

The combined precipitates were suspended in 2 liters of boiling water and heated on a steam bath. A water solution of 30 g. of oxalic acid was added with stirring. This mixture was stirred and heated 4 hours. The mixtures were filtered twice to remove the lead oxalate precipitate. The precipitate of lead oxalate was then reheated 4 more hours in a liter of water with 15 g. of oxalic acid. Again the solution was filtered twice and this filtrate was added to the first.

The clear filtrates were concentrated in a flash evaporator to a viscous solution. The water was removed by freeze drying. The product was extracted with ether in a Soxhlet to remove all of the oxalic acid. It was then extracted with hot ethyl acetate followed by hot carbon tetrachloride. The residue was dried under a 100 watt lamp. For analysis the purified mangrove (A154) was dried in an Abderbalden pistol at 100°C. The yield was 42% of the weight of the starting material.

	C 57.78	H 5.01	
Found	C 57.5	H 4.7	Ash 0.9
	57.6	4.8	0.9
Ash Corr (av.)	58.1	4.8	

The mangrove (A154) was dissolved in small portions in hot absolute ethanol. All ethanol insoluble material was removed by filtration. This was principally ash. The ethanol filtrate was concentrated to a small volume by vacuum distillation on a steam bath. Water was added to the concentrated ethanol solution. This mixture was then distilled to remove the ethanol, while gradually adding water. The resulting thick partly precipitated mass was freeze dried to give purified mangrove (A181).

Found		C 59.52	H 4.88			
		59.40	4.80			
MeO	0.74	C-CH_3	0.92	Ac (alkali)	2.88	
	0.84		0.94		2.99	

Ash None N-None

These results fit the formula $C_{30}H_{26}O_{12}$ with the addition of 1.5 moles of water.

Calc. $C_{30}H_{26}O_{12} - 1.5\ H_2O$
C59.50 H 4.83

Mangrove (A181) was dissolved in water and subjected to continuous ether extraction for ten weeks in order to remove acetyl impurity. This treatment succeeded only partially and the acetyl value of the recovered product was found to be 1.55% (av.)

2. Acetylation

Two grams of mangrove (A181) were dissolved in a mixture of 20 ml. pyridine and 30 ml. acetic anhydride and refluxed one hour, then allowed to stand at room temperature overnight. The mixture was dropped into cold water; the precipitate was collected, washed and resuspended in water; a few drops of hydrochloric acid were added and the precipitate recovered. The dried solid was dissolved in choroform, dropped into ether, and the precipitate recovered. This was dissolved in benzene, insolubles were removed, and the filtrate was concentrated and dropped into methanol. The precipitate was collected, dissolved in benzene, charcoaled, and precipitated again with methanol. The product darkened at 280°C.

Found	C 60.33	H. 4.58	Ac 36.56	(alkaline
	60.17	4.77	36.53	hydrolysis)

Ash None
None

Calc. $C_{30}H_{18}O_4(O\,Ac)_8$
C 60.39 H 4.63 Ac 37.64

3. Methylation

Eighty grams of mangrove (A154) were methylated in methanol with dimethyl sulfate and aqueous alkali in the usual manner under nitrogen. Nighty-five grams of dried derivative were recovered. Methylation in ethanol with diazomethane in ether resulted in large losses during reaction and recovery. The product (27 g.) was chilled from methanol, washed with ether and dried. It did not melt below 270°C.

Found	C 61.16	H 6.01	MeO	25.18	
	61.25	5.80		25.20	
Ash	0.96	C-CH_3	2.10		
	0.44		1.93		
Ash Corr. (av.)	C 61.64	H 5.95			
Calc.	$C_{20}H_{20}O_6(OCH_3)_6 - 2H_2O$				
	C 61.88	H 6.06	MeO 26.25		

4. Isolations of Protocatechuic Acid

a. A mixture of 15 g. potassium hydroxide and 15 g. sodium hydroxide was melted and then 1 g. zinc and 5 g. mangrove (A154) were added slowly to the molten mixture with stirring. When the mass had become brown the heat was removed. The cool solid was dissolved in water, a residue removed and the solution acidified to pH 5 with hydrochloric acid. After removal of more residue, the filtrate was extracted with ethyl acetate. Evaporation of the solvent left an oil which was triturated with ether; insolubles were removed and the ether evaporated. Chloroform was added, heat applied and the solvent decanted from a heavy brown oil. On cooling the solvent chloroform, 3 mg. of yellow crystals appeared. A chromatogram and an infra-red spectrogram indicated the presence of protocatechuic acid. The diacetate was prepared from pyridine and acetic anydride; the melting point was 155-158°C. Mixed melting point with an authentic sample was 156-157°C.

b. To 50 g. of molten potassium hydroxide, 5 g. methylated mangrove was added gradually and alternately with 10 g. potassium hydroxide over a twenty minute period. After cooling and dissolving water, the solution was acidified with sulfuric acid and extracted with ether. The solvent was removed and the residue crystallized from benzene after treatment with charcoal. The yield was 0.2 g. The melting point and mixed melting point with authentic protocatechuic acid was 199°C.

5. Detection of Phloroglucinol

To 50 g. of molten potassium hydroxide was added gradually and alternately 5 g. mangrove (A154) and 50 g. potassium hydroxide over a one hour period. The cool residue was dissolved in water, and the solution was filtered. The filtrate was acidified and extracted with ether. The ether extract was dried and evaporated, and the residue was dissolved in 5 per cent sodium bicarbonate solution. After removal of insolubles, ether was added and the layers were saturated with carbon dioxide. The ether layer gave a semi-solid on evaporation. This was chromatographed with butanol-acetic acid-water (4:1:5). Bis-diazotised benzidine solution revealed a plum colored spot cor-

responding in color and Rf (0.72) to that given by an authentic sample of phloroglucinol under the same conditions. Another chromatogram using m-cresol-acetic acid-water (50:2:48) gave agreement again with an authentic sample (Rf = 0.13). It also gave the usual red color when heated with vanillin and hydrochloric acid as did the mangrove (A154) itself.

Summary

Mangrove tannin has been subjected to purification processes, and derivatives have been prepared from the product. Phloroglucinol and protocatechuic acid were obtained from the product on degradation.

Bibliography

1. Putnam, *J. Am. Leather Chemists' Assoc.* **47**, 512 (1952).
2. Putnam and Gensler, *J. Am. Leather Chemists' Assoc.* **46**, 613 (1951).

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Alum Retannage of Vegetable Tanned Insoles Improved Their Serviceability—Discussion*

Discussion

S. S. Kremen: Starting with the end of World War II there was considerable pressure from military sources for development of an insole which might be called sweat-resistant, or sweat-proof. This demand has now grown to include a good deal of the civilian market. Fortunately, I think the work that has been done since the question was first raised has provided us with several very valuable improvements, of which the latest, that Mr. Beebe described, is a good example—that we have knowledge of how deterioration occurs, how to predict in a laboratory whether any particular treatment will help or will improve the properties of the leather in that respect, and that these methods of prediction have been borne out by the results of service tests. Thus, we now have available for those people who make insole leather more than just one possibility to satisfy both military and civilian consumers. And I think that is a very good position for the industry to be in, compared to the position that they were in right at the end of World War II.

*Original article published in the September, 1954 Journal, Page 630 Discussion followed presentation of the foregoing paper at the Fiftieth Annual Meeting.

W. ROBERT LOTZ (Albert Trostel and Sons): You would get the impression in listening to this paper that there are only two options in making insole leather. A great deal of the commercial insole leather now being sold in this country is being made with chrome-vegetable tannage. Has the Department of Agriculture done any work in examining this along with the work they have done on the alum overtannage?

C. W. BEEBE: We did not intend to convey the impression that there are only two options in making insole leather. In previous reports we have mentioned that chrome-retanned leather gives comparable results with alum-retanned leather for insole leather.

LOTZ: It does give comparable results?

BEEBE: As far as we know. In this wear test we compared only alum-retanned insoles with vegetable-tanned insoles. No chrome-retanned insoles were included.

KREMEN: Perhaps I can help on that. I thought it was implicit in what I said—that the chrome-vegetable combination is acceptable to the military under certain specified conditions as being a sufficient improvement for their purpose. At least what I was concerned with, and Mr. Beebe I think is showing, that there are alternate procedures which will do the same job or come close to it. We are not limited to one way of doing it, which is a good thing. There are now several ways of obtaining what we all need and want—a more sweat-resistant insole.

But I thought it was understood that the chrome-vegetable combination on the basis of the military preference is already acceptable.

LOTZ: This is no criticism of the paper. It is simply a comment that I think the industry is interested in one thing—quality, and we would like to get information from somewhere as to the difference between the three methods. We see here two of the methods compared—vegetable and vegetable plus an alum over-tannage, but I have never seen a comparison of the three which would include the chrome-vegetable.

BEEBE: Because of the number of factors involved, it is necessary to have a large number of test samples to obtain a significant result. For this reason, it was impractical to try to obtain results for several types of insoles at the same time. It would be more satisfactory to make a separate test for each type of insole.

C. W. MANN: I think I can answer that question. The military is interested in improved insoles, as I think most of you are aware, and we have one now—

a combination chrome-vegetable tannage which is excellent. Beginning about 1945 there were tests made on chrome-vegetable tanned as well as alum-vegetable and straight vegetable tanned insoles. In those tests the chrome-vegetable tanned leather proved to be about 67 per cent better than the standard vegetable tanned leather. In the same test, alum-vegetable tanned insoles came out with a rating of something like 50 to 60 per cent better than vegetable. Therefore, it is obvious that either alum or chrome retannage produces quite an improvement in durability of the leather.

Since those tests were made we have continued our interest in the alum mainly on the basis of critical tanning materials. As you know, chrome is imported and in wartime we might be cut off from the source, so we need a domestic material. We think there is a possibility of using alum under those conditions.

I think, also, that the difference between the alum and the chrome probably is not too significant as far as the durability goes. Any improvement over vegetable, as much as 50 to 60 per cent, is a tremendous improvement and you would have to admit that it does produce a very good quality insole. Under practical conditions there may not be any significant difference between the two retannages.

KREMEN: I might add that I can give you a reference on some comparisons which are in the literature. There will be further work published soon on the comparison between chrome-vegetable and other-compared insole tannages.

BOOK NOTICE

Vegetable Tanning Materials. By F. N. Howes. Butterworths Publications, Ltd., London. American Distributors: The Chronica Botanica Co., Waltham, Mass. xii, 325 pages. 1953. Price $5.50.

This work on vegetable tanning materials is an excellent one, and is undoubtedly one of the best that has appeared for some time in the English language. The subject matter is divided into barks, woods, fruits, leaves, roots, plant galls, and miscellaneous tanning materials, many of which have been or are being used locally in the production of native leathers. The introduction to the subject of tannin is a general discussion, dealing with the nature of tannin, its distribution in the vegetable kingdom, its occurence and function in the plant, factors which affect its production in the plant, the early use of tanning materials, the extraction of tannin and its manufacture into extract, and world trade in tanning materials.

In the section on barks, wattle is considered the most important from all angles, and consequently receives the most comprehensive treatment. In descending importance there follow mangrove, oak, spruce, hemlock and eucalyptus. The author shows a keen and accurate knowledge of the factors involved in the handling and curing of both hemlock and oak barks.

The second section is devoted to woods with quebracho, chestnut, oak and cutch of descending importance in the order named. Quebracho receives ample coverage. Because of the slow growth of quebracho, the disappearance of the American chestnut, and the slow growth of the European chestnut, the author feels that the importance of these materials will gradually diminish.

Myrobalams are easily the most important of the fruits. Valonia, divi divi and algarobilla follow in decreasing importance. Sumac and gambier stand first and second in commercial importance among the tannin bearing leaves. The latter, however, does not enjoy the position it once held, due in large measure to the rise in importance of other tanning extracts. At present most of the gambier produced does not enter the tanning field but is diverted to form a constituent of the betel quid so familiar in many Asiatic countries.

It is surprising to note among the tannin bearing roots that canaigre was exploited as far back as 1886, when a tannery was built in Tucson, Arizona, for the production of leather tanned with canaigre. Because of their high starch content, canaigre roots rendered difficult the extraction of tannin from them, and the subsequent production of an extract. This has been overcome in a measure by the work of the U. S. Department of Agriculture. The reviewer has seen excellent quality sole leather made wholly with canaigre extract as produced in the pilot plant of the Eastern Regional Research Laboratory, U. S. Dept. of Agriculture. While plant galls are extremely rich in tannin, they have never been a factor in world trade tanning materials. The most important galls are the oak and Chinese.

The work contains an impressive list of the lesser sources of vegetable tannins and an index of plant names. It is illustrated with 16 half tones and 10 line cuts. It should be in every leather chemist's library. D.W.

ABSTRACTS

Rapid Tannage. By D. A. Blackford. *Shoe and Lea. Reporter* **276**, No. 6, 34 (1954). The author points out the obvious advantages to be derived from a short tannage, and then proceeds to recommend a blend of wattle and myrobalams with a tail liquor of 70° Bk. In two days the strength is raised to 90° Bk. and after 4-5 days is brought to 120° Bk. Complete penetration is achieved in 5 to 7 days. The leather can then be laid away for awhile or drum extracted, and then finished in the customary manner. Firm or mellow leathers can be obtained by a careful selection of the materials used after penetration has been accomplished. When speed of tannage is most essential, a 12-hour syntan pretannage, followed by a 24 to 36 hours drum tannage in vegetable liquors, will give the desired results. Tanners in England are using various modifications of the above two basic processes to produce any type of leather with the characteristics demanded by each one. Two or three factors which are essential for the success of the above systems are proper beamhouse procedures which include complete deliming, proper choice of tanning materials, and control of ash and pH of the liquors.

Dry Cleanable, Water Resistant Sheepskin Suede. By J. W. Robinson. *Lea. and Shoes*, **128**, No. 19, 45 (1954). "Quilon", a water and alcohol soluble compound of chrome and stearic acid, has the property of polymerizing after its application to leather to form a water resistant surface. The chrome portion of the molecular complex anchors itself to the leather in a manner analogous to a chrome salt. The stearic acid portion of the molecule is oriented outward which, after polymerization, gives permanent lubrication and water resistance to the leather fibers. In consequence of this lubrication factor, little or no fat liquor is required. Ordinary dry cleaning mediums, such as perchlorethylene or Stoddard solvent, will not dislodge this lubricating material. The chrome-stearic acid complex is

applied during the coloring operation, the quantity being 15 to 20 per cent on the dry weight of the skins. If a detergent is used in the dry cleaning operation, it is essential that all traces of the detergent be removed to restore the water resistant properties of the leather.

New Chemicals Are Creating Fresh Look-Appeal Qualities for Leather. By O. V. Wederbrand. *Lea. and Shoes*, **128**, No. 19, 42 (1954). Synthetic detergents are recommended for the removal of animal fat or grease from hides or leather in process. For this purpose a sodium salt of a polyether sulfate in concentrations of 0.5 to 1.0 per cent is stated to have been effective. Various Tritons are recommended. The author also deals with emulsion type top coats for side upper leather. These can be diluted with water to give a clear, bright coating which is tight to wet rub.

The Use of Silicone Treatment for Water Resistant Leathers. By W. T. Rossiter. *Lea. and Shoes*, **128**, No. 19, 44 (1954). The author makes the following recommendations for the silicone processing of leather: (1) The leather to be treated should be chrome tanned. It should contain a maximum of from 12 to 15 percent vegetable tannin and 6 to 8 per cent oils. Stuffing or additional vegetable tannin reduces the effectiveness of the silicone process. (2) The leather must be impregnated with Dow Corning 1109. A surface silicone treatment will not give the necessary performance under dynamic conditions. (3) The type of finish which is applied to the leather may have an adverse effect on the degree of water repellency. This can be due to the physical or chemical composition of the finish. When the above precautions are observed it is stated that leathers are produced with outstanding resistance to dynamic water penetration, to chemicals and to perspiration. Leather is being processed for shoes where these claims will be subjected to practical demonstration.

The Temperature of the Foot and Its Thermal Comfort. By R. W. Muncey. Australian. *J. Applied Sci.*, **5**, 36 (1954). Fifteen subjects assessed the thermal comfort of each foot at the same time as measurements were made of the skin temperature on the ball of the foot. The subjective rating of the thermal comfort of the feet of all 15 persons studied depended only on the temperature of the foot and was not affected by the material of the floor, except for the fact that about one quarter of the subjects were prejudiced against the concrete floor. As a rough guide, a comfortable foot temperature will lie mostly in the range from 20 - 27° C. and will require a change of 2 to 3° C. to change the comfort rating.

How Tanners Can Use Plastics to Compete Against Plastics. By R. Quarck. *Lea. and Shoes*, **128**, No. 19, 41 (1954). The author states that the tanning industry is at the beginning of a new era, similar to the one ushered in by the advent of chrome tanning. Sole leather can be tanned with resins alone to produce a product which is flexible, weighs half as much as rubber, apparently wears as well as rubber, and is capable of production in numerous colors. Upper leathers can be produced by resin-vegetable tannage or resin-chrome tannage. The former has the character of a vegetable leather yet the heat resistance of chrome tanned stock. The latter has the characteristics of a chrome leather but the fullness of a vegetable leather. There are also indications that suede leathers can be made more crack-proof than heretofore. The author believes that resins as tanning agents will be most acceptable when used in combination tannages.

Small Scale Filter Paper Chromatography. Factors Affecting the Separation and Sequence of Amino Acids. By J. C. Underwood and L. E. Rockland. *Anal. Chem.*, **26**, 1553 (1954). Studies were conducted to determine the relationships between solvent character, water content of the solvent, acidic and basic solvent supplements, filter papers,

and the separation and sequences of the amino acids on small-scale filter paper chromatograms. With few exceptions the sequence of the amino acids within the acidic, basic, neutral, and cyclic groups was independent of the nine solvents and three filter papers examined. Considered as independent groups, the sequences of the four amino acid groups were influenced to the greatest degree by the acidity or basicity of the solvent. Solvents supplemented with acidic or basic materials, such as formic acid or ammonia, tended to improve the separation and reproducibility of all the amino acids and particularly, the acidic and basic amino acids. Most satisfactory separations of individual amino acids were obtained with tert-butyl alcohol-water-formic acid and phenol-water-ammonia.

Small Scale Filter Paper Chromatography. A Rapid Two-Dimensional Procedure (for the Separation of Amino Acids). By L. B. Rockland and J. C. Underwood. *Anal. Chem.*, **26,** 1557 (1954). A small-scale two-dimensional filter paper chromatography procedure has been developed for the separation of amino acids and related compounds. As little as 0.1 γ of amino acid contained in 0.1 to 1.0μ of solution can be separated and identified on a 5-inch-square sheet of filter paper irrigated in a No. 4 American Medical museum jar. A *tert*-butyl alcohol-formic acid-water mixture is employed as the first solvent and a single phase phenol-ammonia-water mixture as the second solvent. Variations in R_f values as a function of irrigation temperature have been studied for both solvents over the range 5° to 40°C. A chart has been prepared showing the loci of 60 amino acids, peptides, carbohydrates, and organic acids on a diagrammatic small-scale, two-dimensional chromatogram. Chromatograms of test mixtures containing 18 amino acids, a hydrochloric acid hydrolyzate of casein, and an enzymatic hydrolyzate of lactalbumin contained 16, 12, and 16 distinguishable spots, respectively.

Direct Titrimetric Determination of Sulfate. By J. S. Fritz and M. Q. Freeland. *Anal. Chem.*, **26,** 1593 (1954). This work was prompted by the need for a rapid, accurate, and widely applicable titrimetric method for sulfate. The method proposed involves direct titration of sulfate with standard barium solution. Alizarin Red S serves as the indicator, giving a sharp, vivid change from yellow to pink at the end point. The titration is carried out in 30 to 40 per cent alcohol, as no end point is observed in water alone. Equilibrium is quickly attained, permitting a rapid titration. Coprecipitation errors are greater than for gravimetric sulfate methods, but most of these can be avoided by the preliminary removal of cations with an ion exchange column. The simple titrimetric procedure should be useful in many cases where a rapid approximation of sulfate is required. In the absence of interfering anions the ion exchange-titrimetric method is as precise as the gravimetric method and considerably faster.

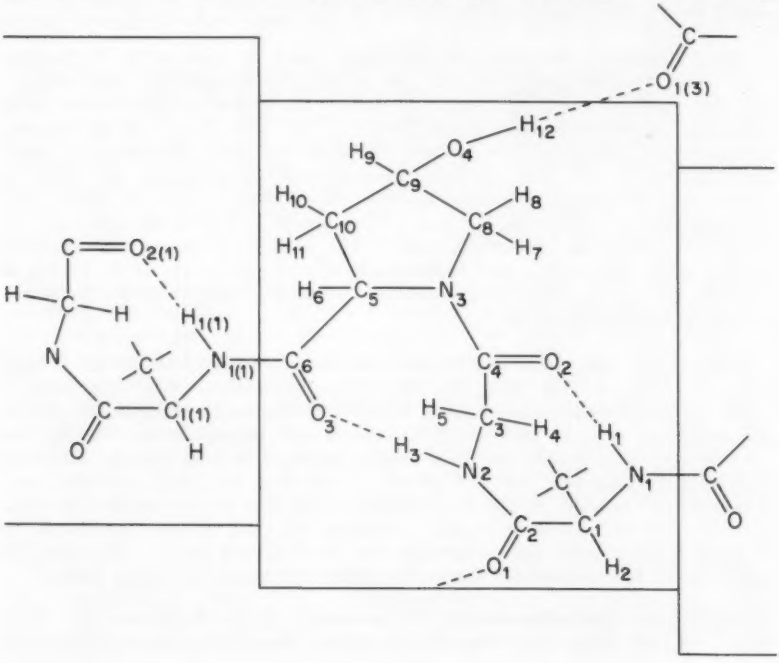
Determination of Copper with 2-(o-Hydroxyphenyl) benoxazole. By E. E. Byrn and J. H. Robertson. *Anal. Chem.*, **26,** 1605 (1954). In the course of an investigation of chelate compounds as analytical reagents, the effect of ethylenediamine-tetraacetic acid on the precipitation of metal ions with 2-(o-hydroxyphenyl) benzoxazole was studied. The latter reagent was found to precipitate copper quantitatively from solutions containing ethylenediamine-tetraacetic acid at a pH of 11. Only those ions which precipitate from ethylenediaminetetraacetic acid at pH 11 interfere, and these can be separated by filtration before the addition of the reagent. Procedures are given for the determination of copper in a nickel-copper alloy, aluminum alloy, cast iron, and bronze. The method is simple, direct, and accurate, and the precipitate has a favorable gravimetric factor.

Turbidimetric Microdetermination of Zirconium. By G. W. Leonard, Jr., D. E. Sellers, and L. E. Swim. *Anal. Chem.*, **26,** 1621 (1954). The recent interest in the chemistry

of zirconium and its compounds has necessitated the development of improved methods of analysis. As the reaction between zirconyl ion and phthalic acid gives a very finely divided precipitate which tends to stay in suspension, the possibility of using this reaction for a simple turbidimetric determination of zirconium was investigated. The zirconium phthalate suspension was found to be very stable and to follow Beer's law up to 125 p.p.m. of zirconium. No critical control of the order of mixing, length of heating, period of cooling, or hydrogen ion concentration was necessary. The interference of the fluoride ion in a solution of known zirconium concentration can be used to estimate concentration of that ion. A simple, direct, and rapid turbidimetric method is described for the microdetermination of zirconium. This technique is useful for the determination of zirconium in the presence of high concentration of various ions.

Improved Bacterimetric Method for Cystine. By G. D. Shockman, J. J. Kolb and G. Toennies. *Anal. Chem.*, **26**, 1657 (1954). A modification of the bacterimetric method for the determination of cystine increases sensitivity, reduces incubation time from 72 to 17 hours, and gives a precision of 2 - 3 per cent on hydrolyzed materials. Actually the method of Riesen, using *Leuconostoc mesenteroides* PD-60 in their oxidized peptone medium, has been modified to bring about the results noted.

The Structure of Collagen. By M. L. Huggins. *J. Am. Chem. Soc.*, **76**, 4045 (1954). A structure has been deduced for that part of the collagen molecule which is responsible for the observed X-ray diffractions. This structure is in agreement with all experimental facts known to the writer. The sequence of residues given by the formula $(RR'R'')_n$,



where R″ represents a residue which is usually proline or hydroxyproline and R and R′ denote other types. The 3-residue group, RR′R″, has the bond structure indicated within the rectangle in the figure (in which R′ and R″ have been taken as glycine and hydroxyproline residues, respectively). (RR′R″). The chain is coiled in a left-handed helix. The coordinates have been computed, assuming: (1) 30 residues per 3 turns and per 28.6 Å.; (2) Pauling-Corey bond angles and lengths in the polypeptide chain; (3) rectilinear N-H . . . O hydrogen bonds, of equal length; (4) planar C-CO-NH-C groups; (5) dimension in the hydroxyproline ring like those in hydroxyproline itself. The computed (not assumed) NHO hydrogen bond length is 2.83 Å. The hydroxyl oxygen of the hydroxyproline residue is 2.9 Å. from a carbonyl oxygen in the next turn of the helix, indicating OHO hydrogen bonding. There are no unreasonably short distances between non-bonded atoms, provided R or R′ of each RR′R″ group is glycine. There are no large holes within the helix, although there appear to be suitable locations for some hydrogen-bonded water molecules, perhaps one per group of three residues. Assuming an average residue weight of 93 and close-packed helices 12.0 Å. apart, the computed density is 1.30 g./cc., or 1.38 if one molecule of bound water per three residues is assumed. The experimental over-all density of collagen has been reported as 1.35 and 1.41.

Stains on Aniline Dyed Leather Uppers. *Lea. World*, **46,** 517 (1954). Since aniline dyed shoe uppers are not pigmented they stain quite readily. One of the commonest causes of stains is dextrin from fabric linings. Another common cause is dyestain from the leather itself, while a third cause is tans from the insole or outsole. In 18 pairs of shoes examined recently by the Shoe and Allied Trades Research Association, over half were affected by dextrin. The lined shoes from four firms had faille-swansdown rubber combined linings, while some had swansdown plumpers in the ramp also. The fifth firm used a heavy drill with a swansdown plumper. There was always one layer of swansdown, and sometimes two layers, beneath the vamp. Most swansdowns contain some organic dressing, usually starch and dextrin. The water extraction of the swansdown taken from the stained shoes showed from 6 to 13 per cent of these materials to be present, hence it was apparent that they were largely responsible for the stains. Toe puffs of the prepared type, celluloid impregnated on one side, and containing 7 to 10 per cent of organic dressing, showed evidence of staining. Laboratory tests indicated that if wetting took place from the edge or from the grain side of the leather, the toe puffs may stain more readily than a swansdown plumper with an equal amount of organic dressing. Evidence also indicated that water soluble dyes, as well as oil soluble ones, may migrate within the leathers and thereby cause stains. Recommendations are made to avoid wear complaints. These are (1) make sure the leather contains no loose dye. (2) Use linings and plumpers with the lowest possible content of organic dressing. (3) Avoid toe puffs containing organic solubles.

Some Recent Research Which Concerns the Economic Aspect of Hides. By F. O'Flaherty. *Lea. Mfg.*, **71,** No. 10, 13 (1954). The Tanners' Council Research Laboratory is endeavoring to evaluate hide in terms of useable hide substance. This first involved a proper sampling position, which was determined to be 20 to 28 inches from the root of the tail along the backbone. A strip 8" x 4" cut from this position is representative of the whole hide. About 75 per cent of the hide represents non-leather making constituents. In addition to the work at Cincinnati, The American Meat Institute Foundation has made decided progress under DeBeukalaer on the curing of hides. This involves the removal of manure and other extraneous materials from the hide before cure. Tanners' Council in a survey found that 335,000 hides carried 800,000 pounds of manure on which freight was paid between points of origin and destination of the hides. The Meat Institute Foundation is also

experimenting to reduce the amount of moisture, salt, fleshings and hair in order to reduce shipping costs. Thus the work at Cincinnati above described dovetails into the work of the Institute. The author touches briefly on the two solvent tannage processes now in pilot plant production. Upper leather can be tanned and finished in a few minutes, sole leather in less than two weeks. For some time now, many of the domestic hides have been affected by X-disease, so called because of a lack of knowledge of it. However, it is now accepted as symptom rather than a disease, and is characterized by kyperkeratosis. Only recently it has been determined that it is caused by the ingestion and absorption of chlorinated naphthalenes contained in lubricating greases. It gets into the feed of cattle from the lubricant of the machines used to make pellets of dehydrated alfalfa. Then too the cattle have been affected by licking waste oil from tractors or other farm machinery. This disease reflects itself mainly on the animal skin and in its advanced stages can depreciate a hide more than 50 per cent of its value. In 1953 this disease caused hundreds of thousands of dollars loss to tanners. Research concerned with finding the cause of the disease and its removal was conducted by the Department of Agriculture personnel. The purpose of all the above research is directed toward the same goal — making a better leather at a cheaper price.

Why the Army is Changing to Chrome Tanned Leathers. *Lea. and Shoes.*, **128,** No. 6, 31 (1954). Beginning in 1947 the Army Quartermaster Corps began a study of the principal variables in the tanning of side upper leathers, leading to a systematic evaluation of retan leather. The types of side upper leather involved in this investigation were (1) straight chrome tanned, (2) straight vegetable tanned, (3) retannage of 20, 40 or 60 degrees, (4) chrome retanned with synthetic materials. About 30 sides of each type of leather, totalling 2300 sides, were involved in the test. A portion of the tanning industry was found to prefer the vegetable retanned leather since it is plumper, dries softer and retains large amounts of stuffing greases. Those opposed to vegetable leather claim that it requires a greater quantity of imported tanning materials; it requires longer tannage; it needs a larger labor force; since it is not produced commercially, existing tanneries must be converted. For these reasons vegetable tannage was not included in the Army study.

Chrome tanned stuffed leather, chrome tanned fatliquored leather, and vegetable retanned chrome leather which was stuffed, figured in the Army tests. Composition of the leathers was as follows:

	H. S. %	Cr_2O_3 %	Grease %	Ve. Tan by Diff. %	pH	Ratio to Cr_2O_3	H. S. Veg. Tan
Chrome tanned Stuffed	61.4	4.0	26.6	0	3.2	6.5	0
Chrome tanned fatliquored	75.4	4.6	8.5	0	3.3	6.1	0
Retan, stuffed	48.3	2.7	25.9	23	3.2	5.6	47

The retan leather was thicker by ½ ounce or 10 per cent. The fatliquored leather was 25 per cent stronger in stitch tear than the retanned product. In the tongue tear test it was 28 per cent stronger. Flexural fatigue and flex burst tests favored chrome leather. The grease content of a leather is not necessarily a measure of its strength or durability since a fatliquored leather containing about one third as much grease as a stuffed leather was not regarded as inferior. No significant difference could be found between retanned and chrome leathers after they were subjected to daily alternate wetting and drying cycles for 2 months. Retanned leathers were found to mildew more readily on storage under both tropical and temperate storage conditions. The chrome and retan stuffed leathers were more resistant to water than the fat-liquored chrome, but the last was superior with respect to water vapor permeability. All leathers were found to dry out in about the same period of time. Chrome leather is less dense than vegetable retanned leather, and fatliquored leather than stuffed leather. In cold climated fatliquored chrome tanned leather is superior to stuffed chrome or retan leathers.

Vegetable Tanning—IX. A Study of Several Methods for Determining the Natural Acidity in Vegetable Tanning Liquors—Part I. D. Burton and J. C. Bickley. *J. Soc. Leather Trades' Chemists.*, **38**, 249 (1954). Previous work has demonstrated the desireability of determining:- (a) The acidity due to free carboxyl groups of pyrogallol tannins (tannin acids). (b) The salts of tannin acids. (c) The acidity due to natural acids such as gallic, lactic and acetic acids. This group also includes other acids preexistent in the natural tanning materials such as oxalic, citric, tartaric and phosphoric as well as uronic acid and pectins. (d) The salts of natural acids. Titration of an undiluted tan liquor with 0.5 *N* NaOH to pH 5.8 gives an accurate measure of (a) plus (c), the partial titration of very weak phenolic groups compensating for the incomplete titration of carboxyls at this pH. It has been suggested that pelt takes up natural acids, hydrochloric acid if chlorides are present and sulfuric acid if sulfates are present with the production of a corresponding amount of the natural acids, tannin acids and tannins containing no free carboxyl groups. The present paper concerns the study of the natural acids (c) by dialysis, chromatographic separation in a hide powder column and by anion exchange resin methods. Methods are also given for determining (a), (b) and (d) also. A synthetic collagenous skin (Naturin) used in making sausages was chosen for the membrane for dialysis. Preliminary study with 30°Bk. myrobalans liquor demonstrated that 3 days was sufficient to reach equilibrium; that tannins did not pass the membrane and that the assumption that the natural acids are distributed equally on both sides of the membrane, at equilibrium, is correct. Total acidity (a) plus (c) was obtained by titration of an aliquot part of the dialysate to pH 5.8 with 0.002 *N* NaOH. The natural acids (c) of the dialysate were determined separately by methods described and the proportion present as free acid and salts determined from the equation $pH = pk + \log [salt]/[acid]$. The pH of the dialysate was 3.2 and the pk values of all the acids are known. The acid and salt content of 30° Bk. myrobalans liquor as determined are given in the following table.

Acid	Total Acid Radical	Present as Free Acid	Present as Salts
Gallic	11	10.3	0.7
Acetic	16	15.8	0.2
Lactic	5	4.0	1.0
Ether insoluble	13	11.0	2.0
Sulfuric	11	0.3	10.7
Hydrochloric	10	0.0	10.0

The tannin acids (a) are determined by substracting (c) from (a plus c). By passing a portion of the dialysate through a base exchange resin the total anion concentration (c) plus (d) was found. As (c) has already been determined, (d) may be found by difference. By subtracting (d) from the total salts, found by resin exchange and sulfonate ash methods, (b) is determined. Summing up, the following results expessed in mg. equiv. per liter were obtained. Natural acids(c) 41, Salts of natural acids (d) 24, tannin acids (a) 31 and salts of the tannin acids (b) 20. In the degerminatuon of (c) a chromatographic method is given for determining gallic acids and its salts. R.H.T.

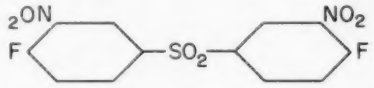
The Influence of Tanning with Masking Salts on Chrome Reversibility and Aging of Chrome Leather. J. C. deWijs. *J. Soc. Leather Trades' Chemists*, **38**, 261 (1954). A brief review of the literature on the subject of reversible chrome tannage is given, pointing out that up to the present, work on this subject has been carried out using leather tanned with basic chrome salts. The present paper is concerned with tests on chrome liquors masked to different degrees with formates and phthalates. Thirty-three percent basic hexaquo-chromi-sulfate, treated with varying amounts of sodium formate

and sodium phthalate at concentrations of 0.1 mole Cr_2O_3 per liter, was used for the tests. The tanning solutions so made were applied to the hide powder until the tanned powder showed 4.5-5.0 percent Cr_2O_3. The tanned hide powder was neturalized until a pH of 5.3-5.7 was reached in the neutralized suspension. It was then stored in a closed vessel. Immediately and at intervals of 1, 2, 3, 4, 6, and 8 weeks, 8 g. portions of the powder were soaked in 50 ml. 0.001 M formic acid solution (pH 3.5) for 3 hrs. at 40°C., the liquor filtered off and examined for Cr_2O_3. From the results obtained it was obvious that tanning in masked chrome liquors has a marked effect on chrome reversibility of the resultant leather, and chrome removal increases with increased masking. Also, with phthalate masked chrome liquor, the leather is more readily dechromed than produced with formate masked liquor, using equal molar amounts of masking agent. Lastly chrome reversibility decreases rapidly with aging. Explanations of these observations, based on the theory of complex activity of anions, are given. R.H.T.

Comparison of the Paraffin and Pressure Degreasing Processes: The Effect on Distribution of the Residual Grease and the Properties of the Leather. M. Dempsey, R. F. Innes and R. G. Mitton, *J. Soc. Leather Trades' Chemists*, **38,** 265 (1954). As it is generally believed that paraffin and pressure degreasing give leathers with different physical properties, it was decided to check this belief by an experiment in which similar skins were degreased by each method and the leather subsequently analyzed for residual grease and subjected to various physical tests. For comparison some of the skins were processed without degreasing; some were degreased with pressure, some were paraffin degreased and some were both paraffin and pressure degreased. The procedures used and the results of assessments are given fully. The main conclusions drawn are:- (1) Both pressure and paraffin remove a considerable amount of grease, though less than the two processes combined. Of the two, paraffin removed a little more. The residual grease is a little more uniformly distributed by the paraffin process. (2) For the type of skin examined, no very marked changes of microstructure or physical properties (compressibility, flexing, behavior under shaving or glazing) result from the substitution of one degreasing process for the other, and the behavior of the skins in subsequent processing is not altered. What slight differences there are in the latter respect seem to favor the paraffin process. (3) The leathers produced from the pressure degreased pelts, under the conditions described, were not more solid than those from the paraffin degreased pelts, but they were thinner. R.H.T.

Reactions of Aromatic Fluorine Compounds with Amino Acids and Proteins. VII. Reaction of p,p′-difluoro-m,m′-dinitrodiphenylsulfonte with Tendon Collagen. By H. Zahn and D. Wegerle. *Das Leder*, **5,** 121 (1954). In previous work it was found that wool or silk treated with 1-fluoro-2,4-dinitrobenzene (FDNB) were modified so that they swelled less in water, absorbed less water vapor and contracted less in 50 percent phenol solution. Treated wool was stable in soil burial tests and was less subject to attack by moths. Cross linkages in silk were formed also by treating it with p,p′-difluoro-m,m′-dinitrodiphenylsulfone (FF sulfone). The latter reacts, with elimination of fluorine as hydrogen fluoride, with either the phenolic groups of tyrosin side chains or with epsilon aminogroups of lysin side chains of the protein. After hydrolysis of the treated silk it was possible to isolate the two cross-linking or bridging amino acids, o,o′-(m,m′-dinotrodiphenylsulfone-p,p′)-bis-tyrosine or Ne,Ne′-m,m′-dinitrodiphenylsulfone-p,p′) -bis-lysine. The results indicate that the various amino acids are not uniformly distributed along the polypeptide chain but are concentrated in different areas. Studies similar to the above were made with collagen. The collagen was made from "collafil" films, an intermediate product in the manufacture of surgical sutures. Collafil has not been treated with alkali nor with

acid stronger than pH 2.5-4.5 and the collagen should therefore be unaltered from native tendon collagen. The film has an average thickness of 0.015 millimeters and contains less than 1% elastin as was determined by boiling with 40% urea solution. The following treatments were given to reduce the ash content from 2% to 0.2% and to raise the pH to the isoelectric point of 6.0-7.5: treatment with 0.5% sodium acetate solution, thorough washing in water, extraction with 10% salt solution for 200 hours, washing, soaking in water for three 24-hour periods, washing in doubly distilled water, dehydration with acetone and conditioning at 65% relative humidity. Analysis showed moisture 20% and, on the dry basis, sulfur 0.3%, ash 0.14-0.16%, fat 0.05%, amide nitrogen 0.72%, total nitrogen 18.9% and shrinkage temperature 63°-65°C. Equal parts of collagen and 2,4-dintrofluorobenzene (DNFB) were allowed to react for 2, 48, 96, or 144 hours, after which the collagen was hydrolyzed and lysine, hydroxylysine and their reaction products were determined in the hydrolysate by paper chromatography. In 144 hours 64.2% of the lysine and 80% of the hydroxylysine reacted with DNFB, as calculated from determinations of the free amino acids in the hydrolysate. Corresponding values calculated from the DNFB-amino acid compounds in the hydrolysate were 41.3% and 57.4% respectively, suggesting some decomposition of the compounds during hydrolysis. Sykes (*J.S.L.T.C.* **36**, 267 [1952]) found no reaction between DNFB and hydroxylysin. The reaction of FF sulfone, and collagen re-



quires an excess of FF sulfone to promote penetration into the fiber but too great an excess will favor the mono- rather than the di-functional reaction. A ratio of 1:2 was chosen corresponding to a 25 fold stochiometric excess, assuming complete difunctional reaction with the epsilon amino groups of lysin and hydroxylysine and the phenolic hydroxl groups of tyrosine. The kinetcis of the reaction between FF sulfone and collagen film was studied by following the reaction (with time) by chromatographic analysis and by determining acid combining power. The reaction reached a maximum in 120 hours. In 200 hours acid binding increased greatly indicating partial hydrolysis of the collagen. FF sulfone had a definite tanning action. Treatment for 120 hours lowered the swelling of collagen film from 230 to 134 (swelling was measured as grams of water taken up by 100 grams of dry collagen); solubility in *N*/15 sodium hydroxide at 50°C in 1 hour was decreased from 14.0% to 3.4%; and the shrinkage temperature was raised from 65-6° to 75-6°. It seemed possible that the shrinkage temperature might have been affected by traces of p,p′-dihydroxy-m,m′dinitrodiphenyl sulfone since dihydroxy-diphenyl sulfone is known to have tanning action. The dinitro compound, however, lowered shrinkage temperature from 65-66° to 60-61°. Formaldehyde tanned leather, after shrinkage, is known to recover most of its length on standing in cold water [Ewald reaction; Z. physiol. chem. 105, 111, 134 (1919)]. Shrunken FF sulfone "tanned" collagen recovered 82% of its original length on standing a few minutes in cold water. Chromatograms on Whatman No. 1 paper with a mixture of 75 parts (volume) of secondary butanol, 15 parts formic acid and 10 parts water, of the total hydrolystate of FF sulfone treated collagen were found to consist of 6 yellow spots. A very faint one of the lowest R_f value was not investigated further; the others were numbered from 1 to 5 in order of their increasing Rf values. Identification was by (1) chromatographic comparison with known substances, and (2) by isolation of the yellow compounds and identification of the amino acids, after alkaline hydrolysis. Derivatives of hydroxylysine could not be prepared because of lack of a suitable preparation of hydroxylsine. The strongest spot, spot 3, was identified by comparison with a known chromatogram as

Ne,Ne'-(m,m'-dinitro-diphenylsulfone-p,p')-bis-lysine or (sulfone bis lysine). Spots 1 and 2 were cut out, extracted with water, after which the extract was concentrated and hydrolyzed in a bomb at 105° with barium hydroxide. The hydrolysate was neutralized, treated with carbon dioxide to remove barium ions and chromatographed after centrifuging. Hydroxylysine was found in the hydrolysate from spot 1 and lysine and hydroxylysine from spot 2. Spot 1 therefore was sulfone-bis-hydroxy-lysine; spot 2, sulfone-lysine-hydroxylysine; and spot 3, sulfone-bis-lysine. Spots 4 and 5 could not be identified by this method because of interfering amino acids. A hydrolysate free from amino acids was prepared by heating 30 grams of collagen film with FF sulfone and 20% hydrochloric acid at 105°C. On cooling and again after concentrating, brown-black precipitates formed that were washed with alcohol to remove humin, and dilute acid to remove amino acids. A paper chromatogram of this material gave 5 spots identical with those found previously except that 4 and 5 were relatively more intense. After alkaline hydrolysis a chromatogram showed the presence of only lysine and hydroxylysine. Tests for tyrosine, dinitro-dianiline and dinitro-dihydroxysulfone were negative. It is planned to prepare mono derivatives of FF sulfone and both lysine and hydroxylysine, then to compare their chromatograms with spots 4 and 5. A quantitative study of the ratio of the mono- to the di-functional reaction is needed to aid in solving the problem of whether the basic amino acids are concentrated in the amorphous parts of the collagen polypeptide chain. If the molecular weight of collagen is assumed to be 39000 there are 419 amino acid residues per molecule of which 12 are lysine and 3 are hydroxylysine. If evenly distributed there would be one lysine every 35 and one hydroxylysine every 140 residues so that difunctional cross linking would be improbable. A more plausible assumption is that of Bear [Adv. Prot. Chem., VII, 153 (1952)] that they are concentrated in the amorphous regions. I.D.C.

Ellagitannins. By O. Th. Schmidt. *Das Leder*, **5**, 129 (1954). A lecture reviewing the structure and properties of chebulagic acid, (first, isolated in 1948-50 from myrobolans and divi-divi) corilagin (divi-divi) and chebulinic, hexahydroxydiphenic and ellagic acids. Corilagin on hydrolysis yields glucose, gallic acid and hexahydroxydiphenic acid; the last is the double lactone, open form of ellagic acid. Extractions with water, methanol, and acetone were made of myrobolans, divi-divi, algarobilla, valonia, spruce bark, oak bark and young chestnut sprouts. These extracts were examined chromatographically for hexahydroxydiphenic acid. Positive tests were obtained but interfering substances could have been present. The myrobalans extracts were examined both before and after sterilization for 15 minutes at 110°C. Hexahydroxydiphenic acid was not found in any of the acetone extracts but was always present in untreated water extracts and often in untreated methonal extracts. It was absent in the sterilized solutions. An enzymatic splitting of the tannin is therefore the cause of the formation, first of hexahydroxydiphenic acid, then of ellagic acid and "bloom". Sterile extracts of ellagitannins may also show separation of ellagic acid after 48 hours because of the acidity (pH 3.2) of the material. I.D.C.

Comments on the Problem of Making Especially full Chrome Leather by Using a Swelling Process before or during the Chrome Tanning. By F. Krames. *Das Leder*, **5**, 134 (1954). Treating flat, fallen raw stock with zero basic chromium sulfate solution before tanning was reported by Küntzel and Naumann (this Jour. 49, 324) to give plump leather. In the discussion Dr. Otto reported that in the United States a mixture of calcium formate and leukanol (a naphthalene-sulfo acid condensation product similar to German Tamol NNO) is used in chrome tan liquors to give uniform chrome distribution. Krames found that satisfactory plumping was obtained by drumming stock for 30 minutes at 18°-20°C.

with 3% of either Tamol NNO or Coralon F in 100% float, followed by tanning in a chrome liquor from 4/12 to 6/12 basic with or without addition of neutral salt. The amount of chromium oxide may vary between 2% and 3.5% and the float from 40% to 100% depending on the type of leather desired. I.D.C.

Fundamental Properties of Leather. IV. The Mechanical-elastic Behavior of Leather at Different Temperatures — A Specific Property of Leather. By W. Grassman and E. Zeschitz. *Das Leder*, **5**, 145 (1954). Makers of synthetic materials find their greatest difficulty in matching those properties of leather which depend on its structure as a biologically developed, microscopically fine, irregular network of woven or felted endless collagen fibers. The properties depending especially on submicroscopic structure are porosity, permeability to air and water vapor, low heat conductivity and large internal surface area. This woven structure is the cause of the relatively high ratio of stitch tear or continued tear to tensile strength; it also greatly influences flexibility and softness. The flexibility of leather is determined by its structure rather than by the properties of the basic material itself, as for synthetics; it should therefore be little affected by temperature changes. This was confirmed by the following experiments at the extreme temperature range of from −70°C. to +70°C. with intermediate points at−20° and +20°C. Stretch was measured on a tensile strength tester jacketed along the test strip with circulating water at the proper temperature (with Genanin anifreeze a −20°) or, a −70°, by surrounding the jaws and specimen with a tube containing pulverized carbon dioxide snow. Specimens were left in the machine 20 minutes to reach the desired temperature before starting the test. The results are shown as stress-strain (load-stretch) curves, each being the average of three measurements. The curves of the 4 temperatures almost coincided for sole, upper and goat, and were separated only silghtly for harness and glove leather. The slightly steeper (less than average increase in stretch with temperature increase) curves at −70° may have been caused by slightly increased stiffness of either the leather itself or the grease. At the highest temperture, (60° for sole, upper and harness and 70° for the other leathers) some leathers showed evidence of becoming horay. Curves for the soft leathers were slightly "S" shaped. The curves for rubbers and plastics were, as a rule, widely separated. At 70° the rubbers stretched 100% under the relatively light load of 200 or 300 pounds per square inch but at −70° they stretched less than sole leather. Different types of rubber showed marked differences in behavior, however. Vinyl plastics and artificial leather with a vinyl base behaved like rubbers. Alpine boots must have soles that are not brittle at low temperatures. Rubber soles from such boots were found to retain their flexibility at −20° showing that it is possible to make synthetic materials with desired properties. These soles, however, were very stiff at −70°. If dry and only lightly oiled, leather retained its original properties in liquid air (−184°), whereas synthetics were so hard, they could be powdered. Although leather now has certain advantages, many of these maybe have lost by future chemical technological advances.

V. Pore-containing Rubber Materials as Soling Materials. By W. Grassman, E. Zeschitz and P. Stadler. *Das Leder*, **5**, 183 (1954). Efforts are being made to develop porous soles based on sponge rubber. Examination of some of these products was made to determine how nearly they resembled leather. They have a density lower than leather and are flexible and comfortable. They do not have the type of porosity that leather, wood, textiles etc. have, in which the pores are continuous openings through the mateerial. In the rubber the pores were isolated, so that the material had a "sealed off" rather than a continuous porosity. The soles varied in thickness from 4.8 to 8.3 mm, in density from 0.49 to 0.85 and had from 4 to 40 pores per sq. mm. The pores varied in diameter from 0.04 to

0.33 mm. Water vapor permeability was less than 5 (leather at least 200) and the material would not transmit water or air. Water adsorption was determined by drying the specimen at 40° in a vacuum over phosphorus pentoxide, then conditioning at 20° and 65% relative humidity. Various leathers absorbed from 15% to 22% of water, the rubber less than 1%. Rubber did not have the "S" shapped load-stretch curve characteristic of leather, but a curve slightly convex to the stretch axis; the stretch is apparenty elastic. It may be possible to make synthetic materials approaching leather in water binding power by building polar groups into the organic polymer and in perosity by incorporating fibrous material in the polymer. I.D.C.

The Conversion of Vegetable Tanning Materials to Amphotannins. A. Küntzel and K. Rosenbusch. *Das Leder*, **5**, 150 (1954). Vegetable tanins are weak acids and become more soluble as pH increases. Their tanning action increases as pH decreases. Chrome salts behave in the opposite manner; astringency decreases as pH decreases. Vegetable tannins can be made to resemble chrome tannins by introduction of a basic (amine) group into the molecule by the Mannich reaction, which is a condensation of an amine, formaldehyde and a component with a reactive hydrogen ion. Mauthe and Faber (this Jour. 48, 639) used this method to make the syntan "Gerbstoff R52" from resorcin, formaldehyde and an aliphatic base. These condensed tannins have been named "amphotannins" because of their amphoteric nature, although they have no technical use in the alkaline range. The condensation process is "amphoterization". A typical condensation reaction is the following: Grind together 15 parts by weight of powdered chestnut extract, 3 parts of paraformaldehyde and 6.1 parts of ethanolamine; heat slowly, with stirring, to 110°C. and hold at this temperature for a short time, then cool. The dark resin readily dissolves in warm dilute hydrochloric acid. For tanning, the solution should be adjusted to pH 3 or 4. Amphotannins are only soluble in stronger acid regions; in weakly acid or in neutral regions they become insoluble because of formation of internal salts. Unlike sulfited extracts the amphotannins can not be used with untreated extracts because of mutual precipitation; they can only be used for pretanning or retanning. They penetrate skin rapidly when strongly acid, then after penetration, their astringency can be restored by reducing the acidity from strongly to weakly acid. Attempts have been made to increase the rate of penetration of vegetable tannins by making the liquors weakly alkaline, then acidifying, but in the alkaline region tannins readily oxidize and the skin can not be protected from swelling. Retannage with amphotannins has been reported to increase the resistance of leather to sweat. Chrome leather retanned with amphotannins will dye like straight chrome tanned leather. Retanage of vegetable leather improves fullness, feel and dying and oiling behavior. Amphoterizatanage of vegetable improves fullness, feel and dying and oiling behavior. Amphoterization can be used to render phlobaphenes soluble and as an aid in determining the constitution of tannins. Crystals found in chestnut amphotannin after long standing were identified as a lactam form of a Mannich base formed from gallic acid (from the tannin) and ethanolamine. I.D.C.

Filling the Filter Tube with Hide Powder for the Quantitative Determination of Tannin by the Filter Method. By E. Grosjean. *Das Leder*, **5**, 153 (1954). The filter tube dimensions are discussed. To fill the tube with French hide powder, weigh 7.5 grams of chromed powder onto glazed paper and break up lumps. Put a piece of cotton gauze over the end of the stopper holding the capillary tube. Add ¼ of the hide powder to the tube and press down firmly. Add half of the remaining powder and press it against the glass walls of the tube leaving an opening in the center into which the remainder of the powder is placed and packed gently. Close the bottom of the bell with a piece of gauze.

Coments by Küntzel point out that a longer tube is needed for German than for French powder, because the former swells more. The German powder felts enough so that a gauze covering on the filled tube is unnecessary. I.D.C.

Studies on Turkish Valonia made in the Country of its Origin. By O. Gerngross and B. Ayata. *Das Leder*, **5**, 173 (1954). Valonia has been considered to have a 2 year ripening cycle, but recent evidence, although unconfirmed, indicates that some fruits may ripen in 1 year. The tannin content of commercial Turkish valonia in recent years has varied between 24% and 37% (shake method; 10% moisture). Tannin contents as low as 16% have been reported in the literature and Procter states that "Caramania Valonia is very inferior." In a years-long search for poor quality valonia some new types of cups were found in Vilayet Konya and Vilayet Usak; the entire cups contained only from 5.1% to 18.4% tannin. Altogether 11 types of cups are described, giving photographs, characteristics, geographical location, etc. However, in some instances, several types were found on the same tree. Tannin content varies with ripeness (tannin decreases during ripening), care taken during harvesting and region. The Turkish Export Control has established 5 grades of valonia based on color, size of cups, weight and foreign matter but not tannin content. Small and medium sized cups frequently had a higher tannin content than large cups, so size is not a criterion of quality. Weight (specific gravity) was closely related to tannin content as a rule. Trillo always has a higher specific gravity than the cups. There were, however, a number of wide deviations from the rule so that basing quality on weight may lead to errors. I.D.C.

Rapid Testing and Numerical Evaluation Of the Covering Power of Casein and Collodion Opaque Colors. By O. Zohlen. *Das Leder* **5**, 187 (1954). The following method was developed to measure the covering power of opaque colors. Make a stripe 0.5 cm. wide with India ink on a sheet (6x10 cm.) of white carton paper. On such a sheet, resting on a white paper base, put a round, glass, (crystallizing) dish with a flat bottom. The dish must have an inner diameter of 8 cm. and a surface area of the base of exactly 50.25 sq. cm. Add to the dish 50 cc. of distilled water for testing casein colors or 50 cc. of organic solvent, for example 50 parts of denatured alcohol and 25 parts each of butyl acetate and ethyl acetate, for collodion colors. The liquid must be exactly 1 cm. deep in the dish. Stir 1 gram of color if of strong, or 2 grams if of weak covering power, into water or solvent and make up to 100 cc. Colors with strong covering power are black (carbon), brown (iron oxide), yellow or orange (lead chromate), and white (titanium dioxide); those with rather weak covering power are yellow, orange, or red (cadmium sulfide or selenide); scarlet, red, and blue organic pigments have weak covering power. Add the freshly prepared, 1 percent test solution from a graduated pipette to the dish with water or solvent until, after stirring with a small glass rod or the pipette tip, the black stripe is not visible. Near the endpoint additions should be made dropwise. Observations, using diffuse daylight, may be made by either of two methods. Method I.—Put the dish directly on the paper with the stripe so that all light must pass through the solution. Method II.—Place an inverted crystallizing dish between the paper with stripe and the dish to which the test solution in being added; light then falls directly on the stripe. Both methods give reproducible results but one may be better than the other depending on conditions and the color being tested. Covering power, D, is inversely proportional to the volume required, therefore $D=1000/x$, where x is the calculated volume of 1 percent test solution that would be required to hide the stripe if the dish had an area of 100 sq. cm. For example, 9.04 cc. of a blue dye was required to hide the stripe therefore $x=9.04$ times $100/50.25=18$. $D=1000/18=55.5$. Results are given for a number of colors; some of these are shown in the following table.

Color	Pigment Content	DI*	DII*
Brown	30% ferric oxide	102	84
Yellow	30% chrome yellow	69	108
Yellow	13% cadmium yellow	42	58
White	40% titanium dioxide	167	245
Orange	13% molybdenum orange	58	71
Scarlet	7.6% organic pigment	43	59
Red	5% organic Bordo	39	34
Black	6% carbon black	115	66

*DI is covering power by power by Method I, DII by Method II.

Method I gave values 40-45% higher than Method II for black colors, but Method II gave higher values than Method I by 28-32% for white colors, by 30-38% for yellow colors and by 20% for orange inorganic pigment products. I.D.C.

Electrophoretic Investigations on Natural and Synthetic Tanning Materials. By W. Grassmann and P. Stadler. *Das Leder*, **5**, 206 (1954). Adsorption may strongly influence or prevent separation of tannins by chromotographic methods or by the discontinuous electrophoretic method on filter paper or other porous carriers. Adsorption does not influence electrophoresis by deviation in an electric field although it is shown by a slower speed of displacement in a given direction. The angle of deviation depends only on the ratio of the speed of flow of the medium to the electrophoretic mobility of the particles. The conditions can be altered by varying the stream velocity, strength of electric field, the buffer, or by using filter paper of different absorbing powers. Chromatograms are shown for 11 natural tannins and 8 syntans. They were obtained with the Elphor-V apparatus using filtered solutions containing 0.5-1% tannin, fed onto S&S 2040b paper for about 8 hours at the rate of 0.05 cc. per hour. Other conditions were: voltage 120 (5 volts/cm.), amperes 8, pH 4.5 with 0.1 normal acetic acid-sodium acetate buffer. The simplest method of detection is to develop color on the paper, using iron salts for ellagitannins, and "Echtsalt" dyes (Bayer, Cassella or BASF) for catechol tannins. Ellagitannins have a non-moving and several moving fractions. Condensed tannins are not separated as sharply as pyrogallol tannins. Ordinary quebracho has almost no moving fraction but sulfited quebracho consists principally of a fraction that moves to the anode. I.D.C.

The Use of Polymeric Phosphates in the Manufacture of Chrome Leather. By C. Riess. *Das Leder*, **5**, 211 (1954). A lecture reviewing the use of polymeric phosphates (Calgon or Coriagen) in tanning chrome leather to obtain leather of greater plumpness. These phosphates are effective because they (1) have a buffering action, (2) repress acid swelling, (3) cause strong hydrotropic swelling, and (4) are strong masking agents. Thicker leather is obtained if Coriagen is used in the pickle than if used at later stages in the tanning process. Pretreatment with Coriagen increases the take-up of chrome; also chrome tanning increases the take-up of phosphate. Posttreatment of chrome leather with Coriagen results in fuller, firmer leather, but leather that is more difficult to dye. I.D.C.

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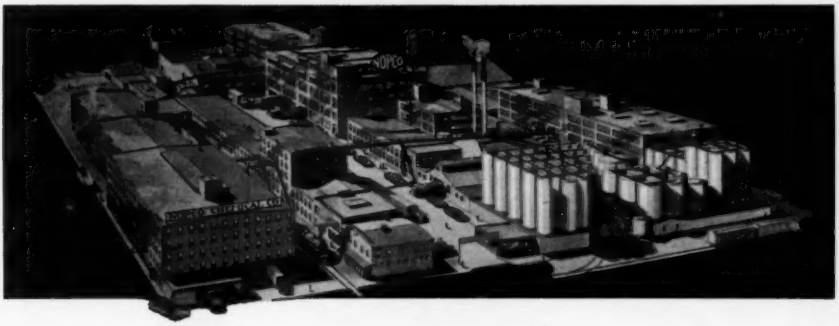

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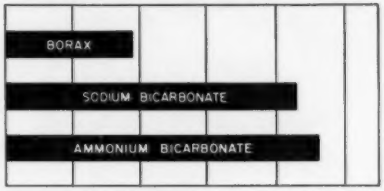
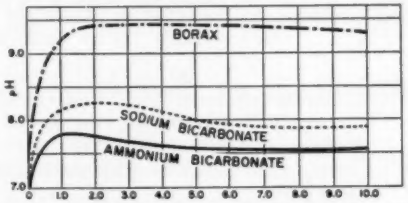


Pounds of hydrochloric acid neutralized by 1 lb. of alkali

2. Lower pH



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INDEX TO ADVERTISERS

AMERICAN CYANAMID COMPANY, Leather Chemicals Department V
AMERICAN EXTRACT CO. ..... Outside Back Cover
ANTARA CHEMICALS XXXIX
APEX CHEMICAL CO., INC. XXXIV
ARKANSAS COMPANY, INC. VI
ARMOUR LEATHER CO. XXXI
ARTHUR C. TRASK CO. XL
ARTHUR THOMAS CO. XXII
ATLAS REFINERY XVI
BARIUM REDUCTION CORPORATION XXV
BARKEY IMPORTING CO., INC. ..... VII—XIX
BONA ALLEN, INC. XXXIII
BORNE, SCRYMSER COMPANY IX
BUCKMAN LABORATORIES, INC. XII
BUFFALO EXTRACT & SUPPLY CO. XLI
CHEMTAN COMPANY XXI
COLUMBIA-SOUTHERN CHEMICAL CORP. XXXVII
DIAMOND ALKALI CO. XXXVI
EISENDRATH TANNING CO. XXVII
FRANK F. MARSHALL XXXI
GARDEN STATE TANNING INC. XXXI
HOOKER ELECTROCHEMICAL CO. XVIII
HOWES LEATHER CO., INC. XXXIII
INTERNATIONAL PRODUCTS CORP. XVII
KEPEC CHEMICAL CORPORATION XXXI
LEATHER AND SHOES XXXII
LEATHER MANUFACTURER, THE XXIX
L. H. LINCOLN & SON, INC. X
MARDEN WILD CORPORATION XXVI
MEAD CORPORATION, THE XIII
MUTUAL CHEMICAL CO. OF AMERICA XL
NEWARK LEATHER FINISH CO. XXXIII
NOPCO CHEMICAL CO. XXIII
OHIO LEATHER CO., THE XXVII
OLSON SALES AGENCY, THE ..... Inside Front Cover
PACIFIC COAST BORAX CO. XXVIII
PENNIMAN & BROWNE, INC. XLI
PRESTO COLOR CO. XXVIII
REILLY-WHITEMAN-WALTON CO. XXIX
RIVER PLATE CORPORATION, THE XIV
ROBESON PROCESS CO. II
ROHM & HAAS IV
SALEM OIL & GREASE CO. XXX
SAXE CUTCH CORPORATION XXVI
SHOE & LEATHER REPORTER XXX
SOCONY-VACUUM OIL CO. I
SOLVAY PROCESS DIVISION, ALLIED CHEMICAL & DYE CORP. XXXVIII
SOUTH AFRICAN WATTLE EXTRACT MFRS. ASSO. XV
SUN OIL COMPANY XXVI
TANEXCO, INC. ..... XLIV—Inside Back Cover
TANNERS' COUNCIL RESEARCH LABORATORY ..... XXXI—XLI—XLII
TANIMEX CORPORATION XXXV
TEAS EXTRACT CO. III
UNION STARCH & REFINING CO. XXXIV
UNITED STATES RUBBER COMPANY XI
UNITED STATES TESTING COMPANY XXXV
WALLERSTEIN COMPANY, INC. XXIV
WARNER CO. XXVII
WHITTEMORE-WRIGHT CO. XXVIII
WOLF, JACQUES & CO. VIII
YOUNG CO., J. S. XX

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